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The mineral resources of Texas

William Battle Phillips, University of Texas. Bureau of Economic Geology and Technology

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Pamphlet dissertation
Vol. No. 29.

BULLETIN
OF THE
UNIVERSITY OF TEXAS
No. 365

SCIENTIFIC SERIES No. 29 OCTOBER 15, 1914

Bureau of Economic Geology and Technology
WILLIAM B. PHILLIPS, Director

The Mineral Resources of Texas

BY

William B. Phillips

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The Mineral Resources of Texas. Wm. B. Phillips. Issued by the State Department of Agriculture as its Bulletin No. 14, July-August, 1910. (Out of print).

The Composition of Texas Coals and Lignites and the Use of Producer Gas in Texas. Wm. B. Phillips, S. H. Worrell and Drury McN. Phillips. University of Texas Bulletin No. 189. July, 1911. (Out of print).

A Reconnaissance Report on the Geology of the Oil and Gas Fields of Wichita and Clay Counties. J. A. Udden, assisted by Drury McN. Phillips. University of Texas Bulletin No. 246, September, 1912.

A Map Showing the Location of Iron Ore Deposits in East Texas; Blast Furnaces; Lignite Mines in Operation; Lignite Outcrops; Producing Oil Fields, etc. Wm. B. Phillips, September, 1912. (Out of print).

Eighteen Press Letters, dealing with various features of mineral production in Texas. (Out of print).

The Fuels Used in Texas. Wm. B. Phillips and S. H. Worrell. University of Texas Bulletin No. 307, December 22. 1913.

The Deep Boring at Spur. J. A. Udden. University of Texas Bulletin No. 363, October 5, 1914. (Out of print).

The Mineral Resources of Texas, by counties, Bulletin 365, 1914.

Potash in the Texas Permian. J. A. Udden, No. 17, 1915.

Map of Thrall Oil Field, Williamson county, 1915.

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INTRODUCTION.

The information contained in this Bulletin has been derived from many sources, chief among these are the following, viz.: The publications of the Texas Geological Survey, 1888-1892; the publications of the University Mineral Survey, 1901-1905; the Annual Reports of the Mineral Resources Division of the United States Geological Survey, 1882-1913; The Mineral Industry, 1892-1913; the Bulletins of the Bureau of Economic Geology and Technology, University of Texas, 1911-1914. In addition various reports on mining properties have been placed at our disposal. Wherever it has been possible to do so the statistics of the United States Geological Survey have been adopted

Latitude, longitude and magnetic declination have been taken from the reports of the United States Coast and Geodetic Survey. Elevations have been taken from Bulletins and topographic sheets of the United States Geological Survey and these have been supplemented by many contributions from railroad companies, to whom our grateful acknowledgments are due.

Nearly all of the analyses and physical tests of stones and brick have been made in our own laboratory by S. H. Worrell, O. H. Palm, J. E. Stullken, Jas. P. Nash and E. L. Porch, Jr.

The physical tests of clays are taken from the report of Dr. Heinrich Ries on Texas clays made for the University Mineral Survey in 1903-1904 and issued by the University of Texas in 1908.

Much valuable information has been obtained from the several volumes of the Texas Almanac and State Industrial Guide issued by the Dallas News. This is one of the best publications concerning Texas.

Statistics of population are from the U. S. census of 1910, unless otherwise stated. Property valuations and railroad mileage are for the year 1913.

The difficulty of preparing a publication on the mineral resources of the State which should be at once hopeful and conservative has been fully appreciated. In petroleum, especially, developments may come with considerable rapidity, as witness the Thrall field, Williamson county, which assumed commercial im-

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portance within a few weeks in the spring of 1915. Where, as in this case, drilling can be done for $1.00 to $1.25 a foot, to a depth of 1000 feet, an oil field can be brought in rapidly. Where the formations are harder and the cost of drilling greater there is a corresponding delay.

Considering the State as a whole it is thought that this present publication covers the ground fairly well. As the work of the Bureau progresses it is hoped that fuller information may be acquired.

WM. B. PHILLIPS.

Austin, Texas, July, 1915.

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CHAPTER I.

STATISTICS OF MINERAL PRODUCTION.

For present purposes we shall have to consider the expression "mineral resources" as of the same meaning as "mineral products," for mineral resources that have not been utilized do not appear in statistics of mineral production. Latent resources may or may not be of commercial importance. They may come into use within the near future, they may not be available until conditions of transportation and of markets undergo a change. Sometimes such changes come with unexpected rapidity, following radical alterations in demand; sometimes they are of slow development following upon the steady depletion of other sources of supply, or the creation of new demands of no great intensity at the beginning.

Mineral production is a fairly safe indication of mineral resources, for there are but few resources that have not already been developed, to some extent, at least.

During the year 1913, the mineral products of Texas were listed under 22 general items and some of these are separable into two or more. These 22 general items were as follows:

Asphalt.
Cement.
Clays and clay products.
Coal.
Copper.
Gems and precious stones.
Gold.
Gypsum.
Iron ore.
Lead.
Lignite.
Lime.
Mineral waters.
Natural gas.
Petroleum.
Quicksilver.
Salt.
Sand and gravel.
Silver.
Stone.
Sulphur.
Zinc.

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Asphalt may be divided into natural rock asphalt and asphalt derived from oil refineries.

Stone may be divided into granite, limestone, sandstone, trap-rock, etc.

The total value of the mineral products for the year 1913 was $31,666,910, including an item of $441,901 for miscellaneous products.

Ten years previously, i. e., in 1904, the total value was $14,353,270, while five years previously, i. e., in 1909, the total value was $17,217,807. The following statement gives the total annual value since the years 1882-1886:

Year.	Value.
1882-1886	$ 4,935,363
1887	1,006,534
1888	1,255,344
1889	1,760,473
1890	1,992,806
1891	2,525,259
1892	3,295,240
1893	2,655,437
1894	3,116,835
1895	2,856,537
1896	2,956,940
1897	3,330,798
1898	3,417,511
1899	4,573,631
1900	5,316,222
1901	6,647,926
1902	9,390,585
1903	12,766,865
1904	14,353,270
1905	13,752,346
1906	14,751,037
1907	19,806,458
1908	15,212,920
1909	17,217,807
1910	18,383,451
1911	18,817,304
1912	22,797,015
1913	31,666,910
Total	$268,161,519

In order to see just what items comprise this total the following statement has been prepared. In explanation of the last item, of $28,629,659, covering the 32 years involved, it may be said that separate statistics are not available. "All others" includes everything not mentioned in the statement. Clay pro-

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ducts include raw clay, brick, tile, pottery, etc. Lime means burned lime and is not included under limestone.

Itemized statement of the value of the mineral products of Texas, 1882-1913:

	Value.
Asphalt:	
Rock	$ 112,260
Manufactured	7,646,481
Cement	8,962,913
Clay products and raw clay	43,093,634
Coal	31,980,159
Copper	16,245
Gold	43,757
Granite	3,053,752
Gypsum	1,800,000
Iron ore	600,000
Lead	28,466
Lignite	8,258,583
Lime	2,532,369
Limestone	5,097,066
Mineral waters	2,831,933
Natural gas	5,099,578
Petroleum	97,429,885
Pig iron	3,000,000
Quicksilver	2,227,807
Salt	3,854,494
Sand and gravel	2,743,496
Sandstone	1,891,936
Silver	7,171,214
Zinc	55,832
Total	$239,531,860
Miscellaneous products for 32 years all others	$ 28,629,659
Grand total	$268,161,519

The following table gives the relative value of these items and the percentage of the total value:

	Value.	Per Cent of total.
Petroleum	$ 97,429,885	40.6
Clay products (and raw clay)	43,093,634	17.9
Coal	31,980,159	13.3
Cement	8,962,913	3.7
Lignite	8,258,583	3.4
Asphalt, manufactured	7,646,481	3.2
Silver	7,171,214	3.0
Natural gas	5,099,578	2.1
Limestone	5,097,066	2.1
Salt	3,854,494	1.6
Granite	3,053,752	1.3
Pig iron	3,000,000	1.3
Mineral waters	2,831,933	1.2
Sand and gravel	2,743,496	1.2

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	Value.	Per Cent of total.
Lime	2,532,369	1.0
Quicksilver	2,227,807	0.9
Sandstone	1,891,931	0.8
Gypsum	1,800,000	0.8
Iron ore	600,000	
Asphalt rock	112,260	
Zinc	55,832	
Gold	43,757	.... 0.6
Lead	28,466	
Copper	16,245	
Total	$239,531,860	100.0

The total value of the petroleum produced is $97,429,885, or 40.6 per cent of the total value. Considerable as this value is, yet it exceeds the value of the coal and lignite, clay products and stone, by a little more than $3,000,000. If to the value of the coal and lignite, clay products and stone be added the value of the sand and gravel, the total value of these common articles almost equals the total value of the petroleum.

If these figures mean anything, they mean that the value of the common things, coal, lignite, clay products, sand and gravel, closely approximates the value of the petroleum, a material the production and treatment of which call for large investments. The stability of the industries based on these common things has also to be considered, for they are not subject to the same fluctuations of value or of interest charges as are often seen in the petroleum industry.

We speak now of crude petroleum, for there is no way of arriving at the value of the different articles made from crude oil. If this value could be included in the discussion we would also have to include the value of the articles made from coal, lignite, clays, sand and gravel. This would lead us too far afield for our present purpose, which is to point out that it is not always the materials requiring large investments that add most to the value of the mineral production.

Another very interesting deduction from this statement is that the total value of the production of metals and metallic ores in the State for 32 years is $13,143,321. This is very little more than the combined value of the stone, sand and gravel. So far as can now be ascertained with a reasonable degree of ac-

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curacy the annual value of the production of the metals and metallic ores in the State, 1882-1913, is as follows:

Year.	Value.
1882-1886	435,363
1887	347,534
1888	475,844
1889	404,126
1890	428,099
1891	793,540
1892	483,347
1893	421,530
1894	379,708
1895	392,768
1896	388,546
1897	386,458
1898	390,642
1899	461,689
1900	592,569
1901	467,538
1902	482,270
1903	723,704
1904	458,237
1905	406,664
1906	430,160
1907	353,835
1908	363,388
1909	410,745
1910	354,893
1911	326,325
1912	383,924
1913	445,411
	$12,388,857
Miscellaneous and not fully stated..	754,464
	$13,143,321

No pig iron has been made in the State since the spring of 1909, and the iron ore industry is not of much present importance. This is an instance of the difference between mineral development and mineral resources. The iron resources of the State are of considerable importance, but the development is not. The resources of the State in the more valuable metallic ores, such as those of silver, lead, copper, zinc, etc., are thought to be much greater than the production would indicate, but, with the exception of silver and quicksilver, they have hardly been touched. Opinions as to the reason for this may and do differ widely. We do not discuss this here, but merely point out certain facts which are accentuated by the statistics of production for nearly a third of a century. A great deal has been

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said and written concerning the mineral wealth of the State as represented by the more valuable metallic ores, particularly such as occur in what is known as trans-Pecos Texas, i. e., the extreme western part of the State, west of the Pecos river. It is unquestionably true that in some parts of this area, comprising about 31,000 square miles, there are the most encouraging indications of mineral wealth, as, for instance, in the Chinati Mountains, Presidio county; in the Quitman Mountains, El Paso county; in the Sierra Diablo, Culberson county; near Altuda, Brewster county, etc. But it is also true that these districts have not been developed and that the shipments made from them do not materially affect the total value of the mineral products credited to the State for many years.

Before stating the annual mineral production, it would be well to mention, as briefly as possible, the sources of the several items comprising the mineral production, and included in the total value of $239,531,860.

Asphalt. Practically all of this material is a product from oil refineries. Very little natural rock asphalt was produced. There are 11 oil refineries in the State with a combined daily capacity of 100,000 barrels of crude oil.

The annual production and value of asphalt-rock and manufactured asphalt, 1894 to 1913, is given in the following table:

Year.	Tons.	Value.
Rock:		
1894	3,000	$ 45,000
1895	1,050	10,000
1896	5,000	25,000
1897	65	650
1898	80	1,000
1903	2,158	30,550
1904	3	60
	11,356	$112,260
Oil Refineries:		
1906	24,900	306,750
1907	53,649	929,857
1908	17,167	350,440
1909	46,304	857,204
1910	57,713	1,040,825
1911	55,826	786,785
1912	94,530	1,404,266
1913	122,026	1,970,354
	472,115	$7,646,481

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	Tons.	Value.
Total rock	11,356	$ 112,260
Manufactured	472,115	$7,646,481
	483,471	$7,758,741

Cement.

Portland cement is made in four plants, two in Dallas county, one in Bexar county, and one in El Paso county.

The statistics of the total production of Portland cement are not complete, but during the five years ending with 1913, the production and value were as follows:

Year	Production. Bbls.	Value.
1909	656,361	$ 808,997
1910	1,292,445	1,643,729
1911	1,700,000	1,785,000
1912	1,762,780	2,062,124
1913	2,108,737	2,663,063
Total	7,520,323	$8,962,913

Clays and Clay Products.

Many counties are represented, but the chief ones are Bastrop, Bexar, Bowie, Denton, Ellis, El Paso, Erath, Fort Bend, Gonzales, Guadalupe, Harris, Henderson, Jefferson, Parker, Rains, Travis, Wilson and Wise. Ellis county was the largest producer of common brick, with 90,481,000. It is the chief clay-working county in the State, as well as the largest producer of cotton.

Texas does not produce much pottery. Red earthenware, stoneware, yellow and Rockingham ware comprise the varieties. The total value of the pottery produced during the five years ending with 1913 was $600,908, an average of $120,181 a year. In 1913, Texas was ninth in the production of common brick and sixth in value; it was eighth in the production of front brick and ninth in value; it was eleventh in the value of sewer pipe. About 60 per cent of the value of all clay products is represented by common brick.

Annual value of clay products (including raw clay):

Year.	Value.
1882-1886	$ 1,500,000
1887	400,000
1888	500,000
1889	600,000
1890	700,000

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Year.	Value.
1891	800,000
1892	900,000
1893	1,000,000
1894	1,028,853
1895	1,030,446
1896	915,753
1897	1,197,039
1898	758,211
1899	1,221,119
1900	1,171,017
1901	1,723,375
1902	1,693,814
1903	1,478,308
1904	1,536,097
1905	1,718,945
1906	1,975,582
1907	2,557,561
1908	2,066,735
1909	3,148,463
1910	2,863,930
1911	2,669,399
1912	2,892,510
1913	3,049,349
	$43,093,634

Coal. The coal producing counties are Eastland, Erath, Maverick, Palo Pinto, Webb, Wise and Young. Since 1895 the amount of coal produced has been 14,615,623 tons, valued at $31,980,159. The original supply of coal is taken at 8,000,000,000 tons and the total workable area at 8,200 square miles, with an additional area of 5,300 square miles that may contain available seams. Erath county is the largest producer of coal.

The amount and value of the coal mined since 1895 is given in the following table:

Year.	Production, tons of 2,000 lbs.	Value.
1895	360,616	$ 801,230
1896	376,076	747,872
1897	422,727	792,838
1898	490,315	968,871
1899	687,411	1,188,177
1900	715,461	1,350,607
1901	804,798	1,655,736
1902	696,005	1,326,155
1903	659,154	1,289,110
1904	774,315	1,652,992
1905	809,151	1,684,527
1906	839,985	1,779,890
1907	940,337	2,062,918

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Year.	of 2,000 lbs. Production, tons	Value.
1908	1,047,407	2,580,991
1909	1,112,228	2,539,064
1910	1,010,944	2,397,858
1911	1,083,952	2,491,361
1912	1,197,907	2,774,956
1913	1,247,988	3,184,161
Total	14,615,623	$31,980,159

Copper.

Some shipments of good ore have been made from the Quitman Mountains, El Paso county, and the Sierra Diablo, Culberson county. The copper resources of trans-Pecos Texas are thought to be worthy of a much larger development than has ever been recorded.

Some shipments of ore carrying 18 per cent of copper have been made from the John Gilcrease claims, northwest side of the Quitman Mountains, El Paso county.

Many years ago, shipments of high grade copper and silver ore were made from the old Hazel mine north of Van Horn, Culberson county, and some development work has been carried on there within the last few years.

The copper ores occurring in the Permian formation in the counties of Foard, Knox, King, Stonewall, Haskell and Jones, contiguous to the Kansas City, Mexico & Orient Railroad, and to the Wichita Valley Railroad, and to the Wichita Falls & Southern Railroad, in Archer county, have not been developed.

These ores occur as rich "pockets" of chalcocite in clays, and also as pseudomorphs of malachite after wood. Many years ago some hopes were entertained of the probable working of these ores and a large amount of money was spent in the counties of Foard and Hardeman, but the enterprise was abandoned and nothing has been done since.

During the last two or three years, some prospecting for ores of copper, associated with the ores of lead and zinc, has been carried on in Burnet county, about 9 miles west of the town of Burnet. Chalcopyrite, galena and zinc-blende occur here in gneissoid granite, associated with calcspar and fluorspar. The district has not been opened sufficiently to allow one to express an opinion concerning it, but good samples of these ores have been submitted for examination.

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In Llano county, especially in the Baby Head Mountains northeast of the town of Llano, some prospecting was done several years ago for copper ore, but nothing has been attempted of late.

The amount of copper credited to the State, since 1906, is 93,285 pounds, valued at $16,245.

Fuller's Earth.

The statistics relating to the production of fuller's earth are not complete. In some years the returns are combined with those of other States, and in some years the returns are included under "miscellaneous." The amount credited to the State is about 2,000 tons, all told, valued at about $16,000. There are excellent fuller's earths in Texas and some of the deposits are extensive. The chief deposits are in the counties of Burleson, Cherokee, Fayette, Gonzales, Shelby, Smith, Walker and Washington.

Tests of these earths have shown that some of them possess exceptional qualities for bleaching refined cotton seed oil and a few have good qualities for deodorizing mineral oils, fats, greases, etc. In this variety of clay we have a material that has peculiar qualities. Some fuller's earths are adapted for treatment of vegetable (edible) oils, some for mineral oils and some for animal fats and greases. The chemical composition appears to have no great influence on the bleaching powers, so that an analysis is of no special value, disconnected from actual trial under working conditions. The mechanical and physical qualities of these earths, the fineness to which they are ground, and, perhaps, more than anything else, the method of using them, determine their value. Complaints have been made that Texas fuller's earth has not had fair treatment, but one must bear in mind that the change from an earth whose working qualities are already known to one whose qualities are not known is often expensive. It requires that a refining company, already satisfied with the earth it is using, shall undertake tedious and costly experiments with other earths. It is not often that such a company is willing to do this. If we are to prove the superior qualities of our earths we must have the evidence that the refiners demand, not so much the evidence that satisfies us as the evidence that satisfies them. Experimentation with fuller's earth is tedious and costly. It can be successfully undertaken only by investigators

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who have had abundant and varied experience in this kind of work. It cannot be left to ordinary chemists, no matter how skillful they may be in the usual processes of laboratory work.

Gems and Precious Stones. This item is of small value. Pearls have been found in the Llano and Colorado rivers and in Caddo Lake, Marion county; topaz at Streeter, Mason county; fine amethysts in Llano and Brewster counties, and opal, with agates, etc., in Brewster county; clear and flawless quartz in Fayette county; turquois in El Paso and Culberson counties.

Gold. Workable gold ores are scarce in Texas. The maximum amount of gold reported in any one year was 387 ounces, in 1896. It occurs sparingly in certain silver-lead ores in trans-Pecos Texas; in association with quicksilver ores in Brewster county; in quartz veins in Blanco, Brewster, Burnet, Gillespie, Llano and Mason counties; in certain recent formations in the Gulf Coastal Plain, and in Cretaceous limestones in Tom Green and Williamson counties. It has also been found in black sands in Llano county and in the sands of the Colorado river, near Austin. So far as can now be ascertained, the total amount of gold credited to Texas since 1889 was valued at $43,757.

Granite. It is hardly possible to give the value of the granite produced in the State up to this time, but it is thought that $3,053,752 would be a fair estimate. This includes the value of the granite used in the construction of the Capitol, which came from Granite Mountain, Burnet county. The highest value recorded, $348,317, was in the year 1904. Quarries are operated in the counties of Burnet, Gillespie and Llano. There are many beautiful varieties of granite in the State and the deposits are very large. The stone used in the Capitol is a coarse-grained red granite, but there are also many excellent quarries of light and dark gray, bluish gray and reddish gray. The so-called opal-granite of Llano county (llanite) is really a quartz porphyry. It is of a reddish brown color, and carries many inclusions of opaline quartz, which gives it a strikingly handsome appearance. It has not been utilized, although the belt of country in Llano county to which it belongs is of easy access. It is a very hard stone and takes a fine

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polish. A fuller description of this granite is to be found under Llano county.

Crushed granite for concrete has met with favor, but the supply has not been steady. Generally, throughout the granite area, embraced in the counties of Blanco, Burnet, Gillespie, Llano and Mason, there are very extensive deposits of a natural granite gravel which makes a good road material. Several of these deposits are immediately along the line of the Austin & Northwestern Railroad (part of the Sunset-Central system), in Burnet and Llano counties.

The annual value of the granite produced in the State, 1882 to 1913, is as follows:

Year.	Value.
1882-1888	$1,000,000
1889	22,550
1890	22,550
1891	75,000
1892	50,000
1893	38,991
1897	3,500
1898	4,685
1899	84,945
1900	76,069
1901	27,005
1902	60,000
1903	173,325
1904	348,317
1905	132,193
1906	168,061
1907	122,158
1908	190,055
1909	173,271
1910	66,909
1911	70,488
1912	67,613
1913	76,067
	$3,053,752

Gypsum. Separate statistics of the production of gypsum are not now available for each of the years under consideration. The traceable amount since 1882 is about 800,000 tons, so that it is not likely that the total amount exceeds 900,000 tons, valued at about $1,800,000. The gypsum (and gypsite) resources of the State are very large, not only in the counties where present operations are conducted (Hardeman and Jones), but in many other counties west of the

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Carboniferous formation and in El Paso, Culberson, Reeves, etc. In Stonewall, King, Knox, etc., there are beds of alabaster up to four feet in thickness, and these beds, although not so thick, are to be seen on the Colorado river northwest of Robert Lee, in Coke county. Gypsite, an earthy variety of gypsum, is the kind produced and used in Texas, at Acme, Hardeman county, and Hamlin, Jones county.

Iron Ore. The iron ore resources of the State are of an excellent character. In east and northeast Texas the total iron ore area is thought to be approximately as follows, by counties:

	Square Miles.
Anderson	47
Cass	350
Cherokee	350
Gregg	22
Harrison	245
Henderson	19
Marion	27
Morris	15
Smith	81
Upshur	10
Wood	25
Total	1191

There are also undefined areas in Panola, Shelby, Rusk, etc., which may bring the total area up to 1,250-1,300 square miles. It is not to be understood that each square mile of this area is ore-bearing, in the commercial sense, for such is not the case. It is meant that over this area workable beds may be found. In east and northeast Texas this iron ore is limonite (hydrated sesquioxide of iron), and siderite (carbonate of iron), the latter variety, however, not constituting a large proportion of the total. The ore exists as "blankets" near the tops of hills and ridges, has generally less than six feet of over-burden (sands, clays and thin sandstones), and varies from two to five feet in thickness. Shipments of several thousand tons of roughly screened but not washed, or calcined ore, carried from 55 to 57 per cent of iron. Taking any one given "bank," however, and considering all of the material that would have to be moved by steam shovel, it is not likely that large and continuous operations would have a better material than ore carrying from 30

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to 35 per cent in iron. This means that in such operations the earth, sand, clays, sandstone, chert, etc., would have to be removed in order to bring the content in iron up to an acceptable percentage, not less than 45 to 50. If this washed or otherwise improved ore should then be calcined, the percentage of iron would increase to 55 to 60 per cent, and the reducibility of the ore in the blast furnace would be greatly enhanced.

For the handling of these ores, coastwise shipments, the Gulf, Colorado & Santa Fe Railway has constructed an iron ore dock at Port Bolivar, Galveston Bay, of a capacity of 3,500 tons a day. It has also built a railroad from Longview, in Gregg county, into the northwestern part of Marion county, to reach the ore deposits there.

Other iron ore areas are in Llano and Mason counties, where excellent hematites and magnetites are found, but there are no commercial developments.

The statistics of iron ore production are not complete, but from the best information to hand, it is thought that the total production since 1882 may be taken as 600,000 tons, valued at $600,000, practically all of it from northeast Texas.

The value of the pig iron made in Texas is not known with certainty, but has been estimated at $3,000,000, 1882-1909. No pig iron has been made in the State since the spring of 1909, when the State furnace, at Rusk, Cherokee county, was closed down.

Lead.

The State has been a very small producer of lead. The total amount credited since 1907 is 320 tons, valued at $28,466. The lead has been derived from the concentration of ores at Shafter, Presidio county, and in the Quitman Mountains, in El Paso county, together with small shipments of ore from near Altuda, Brewster county; the Chinati Mouutains, Presidio county, and prospects on the northwest side of the Quitman Mountains.

The silver-lead ore near Altuda and in the Quitman Mountains is certainly worthy of further development. The former locality is within one mile of the Southern Pacific Railroad and the latter within four miles of the Southern Pacific and the Texas & Pacific Railroads, and within eighty miles of the El Paso smelter.

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There is also a promising lead prospect on the west side of the Chinati Mountains, Presidio county, about forty-five miles from rail. Small shipments of hand-picked ore from this place netted $26.00 a ton at El Paso.

Excellent samples of high grade galena have come from the Solitario, Presidio county, but the locality is almost inaccessible except by pack-train and is about seventy-five miles from rail.

Some prospecting for galena has been carried on in Burnet county, on Silver Creek, twenty-five miles northwest of the town of Burnet, where the mineral occurs in sandstone.

Good samples of galena have also been obtained in the eastern part of Coleman county, but no prospecting has been done there.

The most encouraging outlook for lead ores, carrying a little silver (about an ounce for each per cent of lead) is in the Quitman Mountains, on the northeast and northwest sides (old Bonanza property, now owned and operated by the Southwestern Mines Company, Sierra Blanca; old McKinney property, etc.). On the northeast side of these mountains, where most of the work has been done, and where there is now a concentrating mill, the galena is associated with ores of zinc and copper. The zinc and copper have not yet appeared with the galena on the northwest side, but may do so in depth, especially when one considers that an excellent copper ore has been mined on the John Gilcrease claims almost immediately adjoining the lead properties.

Lignite.

In the State there are about 60,000 square miles of lignite area, occupying, in a general way, that portion of the State lying east of a line drawn from the Rio Grande to Red river through Austin, Waco and Dallas. Of the total known area of lignite in the United States, about 127,000 square miles, nearly one-half is in Texas. The original supply of lignite in this State is taken at 30,000,000,000 tons and the production, so far as can now be ascertained, has been 9,186,455 tons, valued at $8,258,583, to the close of the year 1913.

The lignite producing counties are: Bastrop, Fayette, Henderson, Hopkins, Houston, Lee, Leon, Medina, Milam, Robertson, Titus and Wood. The chief producing county is Wood,

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seventy-five miles east of Dallas, where (at Hoyt and Alba) the normal production is from 1,000 to 1,500 tons a day.

Lignite is used, for the most part, as a fuel under stationary boilers, but about 20 per cent of the production goes for making gas in gas producers to be sent to gas engines. A small amount of "slack," through a ¼-inch screen, is used at hollow-tile works for imparting porosity to the tile, as also to add to the strength. The lignite is mixed with the clay in the machines and burns out in the kilns. It is said that it is much superior to sawdust for this purpose.

There has been a remarkable growth in the lignite industry in Texas during the last ten years. In 1904, the production was 421,629 tons, in 1908 it was 847,970 tons, and in 1913, 1,144,515 tons.

The amount and value of the lignite mined since 1895 is given in the following table:

Year.	Production, tons of 2,000 lbs.	Value.
1895	124,343	$ 111,908
1896	167,939	148,379
1897	216,614	179,485
1898	196,419	170,892
1899	196,421	146,718
1900	252,912	231,307
1901	303,155	251,288
1902	205,907	151,090
1903	267,605	216,273
1904	421,629	330,644
1905	391,533	284,031
1906	472,888	399,011
1907	707,732	715,893
1908	847,970	838,490
1909	712,212	602,881
1910	881,232	763,107
1911	890,641	781,927
1912	990,705	880,788
1913	1,144,515	1,104,759
Total	9,186,455	$8,258,583

No lignite briquettes are made in the State, although many of the lignites are well adapted for this purpose. Briquettes made from raw lignite are not to be recommended. A much better procedure is to drive off all of the water and a part of the volatile combustible matter and to use the residue, mixed with asphalt and some glutinous material as a binder, for the

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manufacture of domestic fuel. Made in this manner, the lignite briquettes are hard, dense, keep well on storing, burn with but little smoke, and have a heating value almost as great as the best domestic coals brought into the State. They can be made and sold profitably at prices varying from $1.00 to $2.50 a ton less than the cost of domestic coal in many cities and towns. From the volatile substances distilled from lignite, an excellent heating and illuminating gas can be made, as well as sulphate of ammonia, light oils, tar and pitch.

By converting the surplus gas, through gas engines, into electric current, a central power plant, making briquettes, could dispose of all of the products from the lignite—gas, tar, light oils, pitch and sulphate of ammonia. The by-products from a ton of lignite costing $1.00 could be made to yield from $3.00 to $3.50.

It may be possible to manufacture gasoline from gas distilled from lignite, although there is no positive information on this subject. There are some lignites in the State which yield nearly 10,000 cubic feet of gas per ton of dry material. The composition of this gas is as follows:

	Per Cent.
Illuminants	1.8
Carbon monoxide	9.8
Hydrogen	56.2
Methane	24.4
Nitrogen	7.8
	100.0

This gas carried 496 B. t. u. per cu. ft.

Considering the steadily increasing demand for gasoline and that it is now made in large quantities from certain kinds of natural gas associated with oil, it would appear that experiments in making this material from gas distilled from lignite should be undertaken at once. By controlling this distillation and removing the gas at regulated intervals, it would be possible to secure products of varying composition. The expense of such investigations has prevented us from undertaking them, but plans are now being made for co-operation between this Bureau and a regular gas plant for the treatment of 100,000 pounds of lignite on a working scale.

Considerable work in this direction has already been done by

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the Bureau, on a small but complete scale, and the results were published in our Bulletin No. 307, entitled, "The Fuels Used in Texas," in the spring of 1914.

We propose now to treat 100,000 pounds of lignite in regular gas retorts, to recover the gas, tar and solid residue, and have enough of each product to prosecute investigations as to the uses to which it may be put. The redistillation and treatment of the tar will certainly yield valuable products, some of which are not now made in the United States. The solid residue from the retorts can certainly be made into high-class domestic briquettes, as has already been shown on a small scale. Sulphate of ammonia can certainly be recovered from the gas, but we do not know whether any other valuable products, such as gasoline, etc., can also be obtained.

Lime.

There are many limestones in the State excellently adapted to the manufacture of white lime. The principal counties engaged in this industry are: Bexar, Comal, Coryell, El Paso, Travis and Williamson, although there are other localities where more or less lime is made. It is not possible to give the exact statistics of this business, but it is thought that the following statement is approximately correct as to the annual value of the lime produced since 1894.

The annual value of the lime produced in the State, 1894 to 1913, is given in the following table:

Year.	Value.
1894	$ 13,308
1895	30,700
1896	60,000
1897	21,862
1898	38,531
1899	79,399
1900	79,659
1901	93,587
1902	82,500
1903	74,038
1904	111,500
1905	142,470
1906	192,527
1907	186,372
1908	144,118
1909	244,845
1910	226,952
1911	218,007

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Year.	Value.
1912	236,101
1913	255,893
Total	$2,532,369

Limestone.

Practically every known variety of stone occurs in the State in very large quantities and in practically every county, with the exception of some of the counties in the Gulf Coastal Plain and in northeast Texas. Analyses and tests are given under each county wherever the information is to hand. During the last years there has been a notable increase in the value of the limestone produced, as in 1909 the value was $241,528, and $590,289 in 1913.

Investigations of many of our limestones with reference to their suitability for road-making are now under way in the road material laboratory of the Bureau of Economic Geology and Technology and the results will appear in a special publication. These investigations also include tests of such stones for use as railroad ballast. Many of these limestones have a crushing strength of more than 10,000 pounds per square inch, while not a few go as high as 15,000 to 18,000.

The use of limestone for building purposes, with the exception of the exterior of some structures made of reinforced concrete, is not large, although many of the deposits afford an excellent stone for such purposes. So far as it is now possible to ascertain the annual value of the limestone produced, 1891-1913, it is given in the following statement:

Year.	Year.
1891	$ 175,000
1892	180,000
1893	28,100
1894	41,526
1895	62,526
1896	77,252
1897	57,258
1898	70,321
1899	100,025
1900	124,728
1901	209,658
1902	228,662
1903	262,053
1904	387,061
1905	171,847
1906	239,125

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Year.	Value.
1907	267,757
1908	314,571
1909	241,528
1910	447,239
1911	490,289
1912	530,251
1913	590,289
Total	$5,097,066

Mineral Waters. The principal localities in which mineral waters that are marketed occur are as follows, by counties:

Bexar:	Hot wells at San Antonio and San José.
Bowie:	Lonestar Mineral Well, Texarkana.
	Daiby Spring, Dalby.
Callahan:	Putnam Mineral Well, Putnam.
Denton:	Brock's Mineral Well, near Denton.
Eastland:	Mangum Wells, Mangum.
	Maurice Wells, Mangum.
Erath:	Southland Springs, Duffau.
Falls:	Marlin Hotel Wells, Marlin.
Galveston:	High Island Mineral Well, High Island.
Grayson:	Tioga Mineral Wells, Tioga.
Gregg:	Capp's Well, Longview.
Harrison:	Rosborough Spring, Marshall.
Hill:	Hubbard Hot Well, Hubbard.
Hopkins:	Sour Wells, Sulphur Springs.
Kaufman:	Crystal Spring, Terrell.
Lamar:	Beauchamp's Well, Blossom.
	Carlsbad Well, Blossom.
	Hefner Spring, Blossom.
Lampasas:	Hanna Springs, Lampasas.
Lavaca:	St. Mary's Mineral Well, near Hallettsville.
Nacogdoches:	Aqua Vitae Well, Nacogdoches.
	Weatherby Spring, Garrison.
Palo Pinto:	Austin Well, Mineral Wells.
	Crazy Well, Mineral Wells.
	Gibson Well, Mineral Wells.
	Indian Spring, Mineral Wells.
	Lamar Spring, Mineral Wells.
	Olympia Well, Mineral Wells.
	Orono Spring, Mineral Wells.
	Star Well, Mineral Wells.
	Texas Carlsbad Spring, Mineral Wells.
Robertson:	Overall Mineral Wells, Franklin.
	Wootan Wells, Wootan Wells.
Smith:	Riviere Wells, Tyler.
Titus:	Roach Well, near Mt. Pleasant.
Williamson:	Georgetown Mineral Wells, Georgetown.
Wilson:	Hume Sour Water Well, Sutherland Springs.

In addition to these, there are hot springs in Brewster county, near Boquillas; in El Paso county; in Presidio county, east of

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Candelaria, and in Travis county, Austin and South Austin. There is a good sulphur spring at Marble Falls, Burnet county, but it is sometimes covered by the water of the Colorado river.

The production and value of the mineral waters in the State, 1889-1913, is as follows:

Year.	Gallons.	Value.
1889	213,700	$ 10,354
1890	298,200	16,040
1891	271,410	23,132
1892	405,400	24,535
1893	359,070	21,957
1894	1,857,950	162,220
1895	1,479,570	72,100
1896	4,005,912	172,138
1897	2,060,292	38,745
1898	842,100	25,120
1899	4,729,950	155,047
1900	5,438,700	209,991
1901	6,651,750	180,503
1902	6,568,550	362,446
1903	939,390	53,613
1904	1,142,500	64,923
1905	1,526,970	144,421
1906	1,045,315	122,085
1907	1,146,279	152,233
1908	1,586,634	151,032
1909	1,033,476	98,499
1910	1,241,248	128,549
1911	1,637,932	158,367
1912	1,292,992	151,395
1913	1,187,612	132,488
Total	48,962,902	$2,831,933

Natural Gas.

The natural gas industry in Texas began to be of some importance in 1909, when the total value of the gas produced was $127,008. Previous to that time the production and value were included in the returns from other States, such as Alabama, Louisiana, etc. At many oil wells natural gas has been used locally for some years.

The principal producing counties are Clay (where there were 33 wells at the close of 1913), Limestone, Shackelford and Webb. The great well at White Point, San Patricio county, across the bay from Corpus Christi, was brought in early in November, 1914, but soon became unmanageable and is now a wreck.

The gas from Clay county (Petrolia field) is piped to Alvord, Arlington, Bellevue, Bowie, Bridgeport, Dallas, Dalworth, Decatur, Denison, Denton, Eagle Ford, Fort Worth, Gainesville,

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Grand Prairie, Henrietta, Irving, Petrolia, Rhome, Sherman, Sunset, Whitesboro and Wichita Falls. The total pipe mileage is about 450. Most of the natural gas produced in the State is from Clay county, 120 miles northwest of Fort Worth. The gas from Limestone county (Mexia field) is piped to Mexia and Teague and arrangements are being made to pipe to Ennis and Waco.

The gas from Webb county (Aguilares, Reiser) is piped to Laredo, the county seat.

The gas from Brown county (Bangs field) is piped to Brownwood.

The Shackelford county gas (Moran field) is piped to Albany, Cisco and Moran.

Gas from Trickham, Coleman county, is piped to Santa Anna

The Navarro county gas (Corsicana) is used locally, as also the gas from McMullen county (Crowther), and from the oil fields of the Gulf Coastal Plain.

Gas from the Caddo field, Louisiana, is used at Atlanta, Bloomburg, Cass, Leigh, Marshall, Queen City and Texarkana.

There are promising natural gas fields in Bexar county, from 20 to 30 miles south and southwest of San Antonio, but they have not been developed.

The gas wells on Holloway Mountain, northwest part of Brown county, are not being used commercially. Other notices of natural gas will be found under the separate counties, Gonzales, Houston, Maverick, Presidio, Trinity, etc.

The record of the natural gas industry in Texas, 1909-1913, is given in the following table:

Year.	Number of producers.	Number of consumers.		Total value of gas produced.	Wells.		
					Drilled.		Productive, Dec. 31.
		Domestic.	Industrial		Gas.	Dry.	
1909	17	5,035	130	$ 127,008	7	6	38
1910	19	14,719	133	447,275	22	5	52
1911	29	22,972	303	1,014,945	19	14	69
1912	41	27,226	329	1,405,077	24	23	87
1913	50	37,350	393	2,073,823	43	29	123

The total value of the natural gas, 1909-1913, is $5,068,128. During the three years ending with 1913, the total amount of natural gas produced in Texas was 25,183,521,000 cubic feet,

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valued at $4,493,845, or a little over 17 cents per thousand cubic feet.

The manufacture of gasoline from natural gas has progressed rapidly during the last three or four years, but none is made in Texas. During 1911, 1912 and 1913 the total quantity of gasoline made from natural gas in the United States was 43,567,835 gallons, valued at $4,547,623, or a little of 10 cents a gallon. The gas used was more than 17,000,000,000 cubic feet. The chief producing State is West Virginia.

Some experiments, made by the Bessemer Gas Engine Company, Grove City, Pennsylvania, on natural gas from Electra, Wichita county, Texas, showed a yield of 3.5 gallons of gasoline per thousand cubic feet of gas. This result was higher than the average yield in West Virginia, which was 2.57 gallons in 1913.

The extraction of the gasoline from natural gas does not materially affect the quality of the gas for ordinary uses.

The manufacture of gasoline from gas distilled from lignite might open new avenues for the use of lignite. No practical work has been done in this direction, but plans are now being made by the Bureau of Economic Geology and Technology towards this end, as has already been stated under Lignite.

Gas distilled from lignite in regular gas retorts will be used for these investigations. In addition to the gas which can be thus obtained there will be other by-products, such as tar, ammoniacal liquor and solid residue, all of which can be made to yield valuable commercial products.

Petroleum.

So far as can now be ascertained, the production of petroleum in Texas, from 1889 to the close of 1913, was 183,731,197 barrels, valued at $97,429,885. To the close of the year 1900, the total production was 2,123,908 barrels, valued at $1,699,462. Practically all of this production was from Corsicana, Navarro county, classed, for statistical purposes, in the North Texas fields. Up to 1896 there was practically no oil produced in Texas for commercial purposes, if we except the operations in Nacogdoches county, between 1887 and 1890, of which we have no definite records as regards production. From 1889 to and including 1895, the total output of the State, so far as is now known, was but 361

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barrels, valued at $1,999, all of which came from the Dullnig wells, near San Antonio. This was lubricating oil and the average price per barrel was a little over $5.53. This price may be contrasted with the prices that maintained shortly after the opening of the Spindle Top field, near Beaumont, Jefferson county, 1901-1902, when oil was sold as low at 18 cents a barrel.

It was not until 1901 that the production in the State during any one year reached a million barrels. For statistical purposes the oil fields are divided into two classes, North Texas, including Corsicana and Powell, in Navarro county; Electra, Wichita county; Henrietta-Petrolia, Clay county, and the new field in Marion county, northeast Texas. The Coastal Texas (Gulf Coastal Plain) oil fields include Batson, Saratoga and Sour Lake, Hardin county; Spindle Top, Jefferson county; Humble and Goose Creek, Harris county; Dayton, Liberty county; Markham, Matagorda county.

The following statement gives the total production of these two great fields from 1902 to the close of 1913:

	Barrels.
Coastal Texas	153,873,162
North Texas	23,335,469
Total	177,208,631

During the last three years, however, the production in the North Texas field was 46 per cent of the entire production, and for the year 1913 it exceeded the production in the Coastal field by 3,259,026 barrels.

The following tables give the annual production and value of the petroleum, 1889-1913, and the production and value by districts from 1902 to the close of 1913.

The annual production and value of petroleum, 1889 to 1913, is as follows:

Year.	Bbls.	Value.
1889	48	340
1890	54	227
1891	54	227
1892	45	225
1893	50	210
1894	60	420
1895	50	350
1896	1,450	4,000
1897	65,975	65,975
1898	546,070	282,249
1899	669,013	473,443

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Year.	Bbls.	Value.
1900	836,039	871,996
1901	4,393,658	1,247,351
1902	18,083,658	3,998,097
1903	17,955,572	7,517,479
1904	22,241,413	8,156,220
1905	28,136,189	7,552,262
1906	12,567,897	6,565,578
1907	12,322,696	10,410,865
1908	11,206,464	6,700,708
1909	9,534,467	6,793,050
1910	8,899,266	6,605,755
1911	9,526,474	6,554,552
1912	11,735,057	8,852,713
1913	15,009,478	14,675,593
	183,731,197	$97,429,885

The production in Orange county in 1913 was 17,706 barrels. The production in the Goose Creek field, Harris county, in 1913, was 249,641 barrels. Both of these are included in the total production.

In 1912 the Goose Creek field produced 43,898 barrels.

The total value includes $19,123 for Orange county and $206,311 for the Goose Creek field, Harris county, 1913.

In 1912 the value of the production from the Goose Creek field was $27,791.

Production of Petroleum in Northern Texas, 1902-1913. Barrels of 42 Gallons. Statistics of the United States Geological Survey.

Year.	Corsicana, Navarro County.	Henrietta, (Petrolia) Clay County.	Powell, Navarro County.	Marion County.	Electra, Wichita County.	Total, including other districts.
1902	571,050	----------	46,812	----------	----------	617,871
1903	401,817	----------	100,143	----------	----------	501,960
1904	374,318	65,455	129,329	----------	----------	569,252
1905	311,554	75,502	132,866	----------	----------	520,282
1906	332,622	111,072	673,221	----------	----------	1,117,905
1907	226,311	83,260	596,897	----------	----------	912,618
1908	211,117	85,963	421,659	----------	----------	723,264
1909	180,764	113,485	383,137	----------	----------	681,940
1910	137,331	126,531	450,188	251,717	----------	996,403
1911	128,526	168,965	373,055	677,689	899,579	2,251,193
1912	233,282	197,421	251,240	362,870	4,227,104	5,275,529
1913	158,830	344,868	282,476	262,392	8,131,624	9,184,252
Total	3,267,422	1,312,612	3,841,023	1,554,678	13,258,307	23,335,469

The high-water mark of production was reached in 1905, when the amount was 28,136,189 barrels, but the high-water mark of

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Value of petroleum in Northern Texas, 1902-1913. Barrels of 42 gallons.

Year.	Corsicana. Value.		Powell. Value.		Henrietta (Petrolia). Value.		Electra. Value.		Marion County. Value.		Total value of all districts.
	Total.	Per bbl., cents.	Total.	Per bbl., cents.	Total.	Per bbl., cents.	Total.	Per bbl., cents.	Total.	Per bbl., cents.	
1902	410,536	71.89	9,863	21.07							$ 420,399
1903	458,071	114.	57,291	57.16							515,314
1904	315,656	87.	55,611	43.	65,455	47.5					412,360
1905	258,590	83.	66,433	50.	35,906	47.5					361,604
1906	310,941	93.5	356,144	52.9	72,197	65.					740,542
1907	228,845	101.1	407,186	68.2	78,946	94.8					721,577
1908	153,489	72.7	274,536	65.1	46,947	54.6					479,072
1909	130,335	72.1	199,952	52.2	58,694	51.7					393,732
1910	87,623	63.8	242,440	53.8	69,086	54.6					505,396
1911	74,439	57.9	186,528	50.	92,046	54.5	492,175	54.7			1,213,960
1912	149,393	64.	193,432	76.9	134,681	68.2	3,340,828	70.	290,974	80.2	4,112,826
1913	156,844	98.7	216,403	76.6	342,783	99.4	8,142,797	101.4	261,965	79.8	9,125,185
Total and average	2,734,762	81.6	2,265,825	55.6	996,741	57.9	11,975,800	75.	552,939	80.	$ 19,001,967

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Production of petroleum in Coastal Texas, 1902-1913. Barrels of 42 gallons. Statistics of the United States Geological Survey.

Year.	Batson, Hardin County.	Saratoga, Hardin County.	Sour Lake, Hardin County.	Matagorda County.	Spindle Top, Jefferson County.	Dayton, Liberty County.	Humble, Harris County.	Other districts.	Total, including other districts.
1902	----------	44	888	----------	17,420,949	----------	----------	----------	17,465,787
1903	4,518	8,848	159	----------	8,600,905	----------	----------	a.30	17,458,612
1904	10,904,737	739,239	6,442,357	151,936	3,433,842	----------	----------	a.50	21,672,161
1905	3,774,841	3,125,028	3,362,153	46,471	1,652,780	60,294	15,594,310	a.30	27,615,907
1906	2,289,507	2,182,057	2,156,010	3,600	1,077,492	92,850	3,571,445	77,031	11,449,992
1907	2,164,453	2,130,928	2,353,940	1,573	1,699,943	108,038	2,929,640	21,563	11,410,078
1908	1,596,570	1,634,786	1,595,060	62,640	1,747,537	39,901	3,778,521	31,185	10,483,200
1909	1,206,214	1,183,559	1,703,796	29,103	1,388,107	17,647	3,237,060	87,089	8,852,527
1910	1,113,767	1,024,348	1,518,722	455,999	1,182,436	9,582	2,495,511	129,497	7,929,863
1911	1,023,493	925,777	1,364,880	561,828	965,939	4,344	2,426,220	2,800	7,275,281
1912	844,563	1,116,656	1,175,108	613,292	822,916	12,151	1,829,923	44,920	6,459,528
1913	741,350	937,720	1,348,053	294,553	716,374	13,329	1,504,880	1,620	5,825,226
Total	25,661,013	15,000,097	23,020,082	2,219,995	40,709,220	328,136	37,370,510	395,765	153,873,162

a Bexar county. Note.—The production of Saratoga and Sour Lake for 1902 and 1903 is included in the grand total.

The Spindle Top (Beaumont) field came into production in January, 1901. During that year the yield was 5,185,883 barrels, valued at $949,307, or 18.3 cents per barrel.

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Value of petroleum in Coastal Texas, 1902-1913. Barrels of 42 gallons. Statistics of the United States Geological Survey.

Year.	Batson.		Saratoga.		Sour Lake.		Matagorda County.		Spindle Top.		Dayton.		Humble.		Total, including other districts, dollars.
	Value.		Value.		Value.		Value.		Value.		Value.		Value.		
	Total, dollars.	Per bbl., cents.	Total, dollars.	Per bbl., cents.	Total, dollars.	Per bbl., cents.	Total, dollars.	Per bbl., cents.	Total, dollars.	Per bbl., cents.	Total, dollars.	Per bbl., cents.	Total, dollars.	Per bbl., cents.	
1902			8,967	20.	14,413	32.15			3,563,285	20.45					3,586,665
1903	1,125	25.	c2,212,039	25.	c	c			2,212,039	25.					7,002,165
1904	3,707,671	34.	244,660	33.	2,401,911	37.3	51,625	34.	1,337,655	38.9					7,743,860
1905	1,025,025	27.2	872,285	28.1	1,117,261	33.2	16,677	36.	612,282	37.	18,255	30.3	3,528,768	22.6	7,190,658
1906	1,199,625	52.4	985,543	45.	1,155,475	53.6	a41,556	51.6	666,287	61.8	40,265	43.4	1,736,165	48.6	5,825,036
1907	1,913,875	88.4	1,742,913	81.8	1,944,343	82.6	a10,811	81.5	1,521,304	89.5	80,559	74.6	2,456,892	83.9	9,680,286
1908	885,965	55.6	989,167	60.5	982,769	61.6	b33,267	42.9	1,030,403	58.9	19,818	49.7	2,269,341	60.	6,221,636
1909	851,138	70.6	864,938	73.8	1,227,734	72.1	21,918	75.3	1,041,791	75.1	11,471	65.0	2,314,082	71.5	6,399,318
1910	851,927	76.5	789,761	77.1	1,203,920	79.3	250,050	54.8	961,758	81.3	6,815	71.1	1,927,879	77.3	6,100,359
1911	704,788	68.8	739,247	79.8	995,807	72.9	305,588	54.3	724,973	75.	2,946	67.8	1,864,598	76.8	5,340,592
1912	625,812	74.1	827,847	74.1	874,897	74.5	406,032	66.2	654,778	79.6	8,473	69.7	1,313,229	71.8	4,739,887
1913	670,323	90.4	855,935	91.3	1,350,379	100	266,338	70.4	716,993	100	10,633	79.8	1,453,158	96.5	5,550,408
Total	12,437,276	60.3	11,133,302	62.7	13,268,909	63.6	1,403,862	56.7	15,043,553	61.9	199,235	61.3	18,864,112	67.5	75,380,870

a—Includes Hoskins Mound. b—Includes Goose Creek. c—Values of Saratoga and Sour Lake combined, estimated at 25 cents a barrel. The Spindle Top (Beaumont) field came into production in January, 1901. During that year the yield was 3,593,113 barrels, valued at $630,752, or 17.5 cents per bbl.

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value was in 1907, when the total value was $10,410,865. The 12,322,696 barrels produced in 1907 were worth $2,858,603 more than the 28,136,189 barrels produced in 1905.

Prior to the year 1900 practically all of the petroleum produced in Texas came from the Corsicana field. Since 1898 that field has maintained its reputation for supplying high grade oil, the average price, per barrel, being 81.6 cents during the 12 years ending with 1913. The total production of the Corsicana field may be taken at 5,448,820 barrels, valued at $4,856,844. The Powell field, also in Navarro county, yields a heavier oil than the Corsicana field. It came into production in 1902 and has yielded 3,841,023 barrels, valued at $2,265,825, or 55.6 cents a barrel. The Henrietta field, Clay county, came into production in 1904, and has yielded 1,312,612 barrels, valued at $996,741, or 57.9 cents a barrel.

The Electra field, Wichita county, came into production in 1911, and has produced 13,258,307 barrels, valued at $11,975,800, or 75 cents a barrel. This is also a high-grade oil.

The other oil field classed as belonging to Northern Texas is in Marion county, in northeast Texas. It is the Caddo Lake district in Texas, and may be the west extension of the Caddo fields in Louisiana. It came into production in 1910, and has yielded 1,554,678 barrels, valued at $552,939, or 90 cents a barrel.

The entire production of all of the Northern Texas fields may be taken at 25,415,450 barrels, valued at $20,648,149.

In Coastal Texas the first of the great fields to come into production was that at Spindle Tom (Beaumont), Jefferson county. It began to produce in January, 1901, and since that time has yielded 45,895,103 barrels, valued at $16,002,860, or an average of 35 cents a barrel.

Saratoga and Sour Lake, Hardin county, came into production in 1902. The statistics for these two fields are combined for the years 1902 and 1903, but since 1904 Saratoga has yielded 15,000,097 barrels, valued at $11,133,302, or 62.7 cents a barrel. Since 1904, Sour Lake has yielded 23,020,082 barrels, valued at $13,268,909, or 63.6 cents per barrel.

The Batson field, Hardin county, came into production in 1903, but it was not until 1904 that the yield was considerable.

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Since 1903, it has produced 25,661,013 barrels, valued at $12,437,274, or 60.3 cents per barrel.

Matagorda county (Markham, etc.) came into production in 1904 and has yielded 2,219,995 barrels, valued at $1,403,862, or 56.7 cents per barrel.

Dayton, Liberty county, came into production in 1905, and since that time has yielded 328,136 barrels, valued at $199,235, or 61.3 cents a barrel.

The Humble field, Harris county, came into production in 1905 and has yielded 37,370,510 barrels, valued at $18,864,112, or 67.5 cents per barrel. During its first year, this field produced 15,594,310 barrels, but fell to 3,571,445 barrels the following year, and in 1913 produced 1,504,880 barrels.

The pipe line mileage in the State is probably close to 2,000 miles at this time. The natural gas pipe line mileage, all told, is about 600 miles.

There are 11 oil refineries in the State, with a combined daily capacity of about 100,000 barrels.

Potash Salts.

Our excuse for mentioning potash salts as among the mineral resources of the State is that certain statements, in no manner authorized by us, have found their way into the public prints to the effect that such deposits had been found here in commercial quantities. These statements are erroneous. They probably arose from publications issued by this Bureau that in water taken from the depth of about 2,200 feet in a deep boring at Spur, Dickens county, some 200 miles west of Fort Worth, we did find potassium chloride to the amount of 324 grains per United States gallon. The water above and below this depth did not contain so much. This amount of potash, while higher than in any other water reported from the United States, is far from commercial possibilities. It merely indicates that somewhere about this depth in this particular well there was an unusual amount of potash. Quite recently we have examined certain cuttings from a well in Potter county, 23 miles northwest of Amarillo. At a depth of 875 to 925 feet we found that the soluble portion was 87 per cent, and of this there was 9.23 per cent of potash (K_2O), equivalent to 14.81 per cent of potassium chloride. This is distinctly encouraging. So far as known, this material con-

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tained a much larger amount of potash than any deep borings have shown in any part of the United States.

A well in Randall county, 16 miles southwest of Amarillo, has also yielded borings from a depth of 1,700 to 2,100 feet which contained 25 per cent of soluble matter, which held 2.79 per cent of potash, equivalent to 4.38 per cent of potassium chloride.

Dr. J. A. Udden, geologist for the Bureau of Economic Geology and Technology, discussed the question of the existence of potash salts in Texas in the American Fertilizer, Philadelphia, December, 1912, and much more in detail in Bulletin No. 307, of the Bureau, entitled "The Deep Boring at Spur," issued during the summer of 1914.

In a paper presented before the American Institute of Mining Engineers at its New York meeting, February 15-17, 1915, entitled "Possible Sources of Potash in Texas," the writer reviewed the entire subject and gave, also, an account of the discovery of nitrate of soda in Presidio county and nitrate of potash in Brewster county. None of the localities examined appears to present commercial possibilities. In Presidio county, near Candelaria, there are a few thin seams of nitrate of soda held in rhyolite (an igneous rock). East of Maverick Mountain, and between this and the Chisos Mountains, southern part of Brewster county, there are thin seams of nitrate of potash in a Cretaceous sandstone, and this substance is also found in El Paso county, in small caves inhabited by bats and rats, and in Presidio county at a locality about 55 miles south of Marfa. On the Devil's river, Val Verde county, nitrate of soda and potash has been found in the debris of an old Indian camp. This material is also reported from near Burnet, Burnet county. But, so far as known, not one of these localities can be expected to yield either nitrate of potash or nitrate of soda in commercial amounts. Whether deep borings in any part of the State will reveal sources of potash salts that may be utilized remains to be seen. There are indications of the existence of beds of potash salts in Potter county, both northwest and southwest of Amarillo, but it will require much exploitation and the expenditure of considerable capital before definite information can be acquired. The importance of the subject is certainly very great, for we do not

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produce any potash salts of much consequence in the United States. Practically all that we use is imported from Germany, the value of such imports during the year 1913 having been $10,793,913. During the five years ending with 1913, the value of the potash salts brought into the United States was $49,361,115.

We are aware of the risk one takes in venturing to predict this, that or the other. At the same time, it appears to us that there are localities in Texas where deep borings for potash salts might be undertaken with fair prospects of success. These localities are contained within the area from Potter county on the north to the Texas & Pacific Railway on the south, and include the counties lying along the Texas-New Mexico border and immediately east. Deep boring in this region would be expensive. It is not likely that the cost would be less than $10 a foot, and it might be more. The more favorable localities would appear to be in Potter and Randall counties and near the salt basins in the counties of Lamb, Bailey, Hockley, Cochran, Yoakum, Terry, Gaines, Andrews, Loving, Winkler, Ector, Ward and Crane.

Quicksilver.

The production of quicksilver is given at 52,178 flasks, valued at $2,227,807, since the year 1900, when the industry began. This figure is probably lower than the actual production, and we are inclined to take the total amount at 55,000 flasks, valued at $2,310,000. All of this has come from the Terlingua district, southern part of Brewster county, from 80 to 90 miles south of the Southern Pacific Railway.

The real possibilities of this district have hardly been touched. For the last several years the average content of quicksilver in the ores treated has been much above the average in the California ores. For the last 15 years Texas has ranked second in the production of quicksilver, with California considerably in the lead. But for lack of transportation facilities, the Terlingua district could easily show a much greater development than has been recorded. The following statement gives the annual production, in flasks of 75 pounds, net, and the value from 1900 to the close of 1913:

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Year.	Flasks of 75 lbs. net.	Value.
1899	1,000	$ 42,000
1900	1,800	75,600
1901	2,932	132,438
1902	5,319	239,350
1903	5,029	211,218
1904	5,336	232,116
1905	4,723	172,362
1906	4,761	178,829
1907	3,686	148,387
1908	2,384	122,260
1909	4,188	194,084
1910	3,320	154,413
1911 (Est.)	2,000	84,000
1912 (Est.)	2,700	114,750
1913 (Est.)	3,000	126,000
Total	52,178	$2,227,807

Salt. So far as actual statistics are concerned the production of salt, since 1892, is taken at 6,646,422 barrels, valued at $3,854,494. For three of these years the returns were estimated. This amount is probably less than the real production, as no account was kept of the salt hauled in wagons from old salt lakes, etc., in the counties of Crane, El Paso, etc. It is impossible to estimate the amount of this salt, but it would hardly be more than 500,000 barrels for the period of 1892-1913. The statistics given are from the counties of Anderson, Mitchell and Van Zandt.

Heavy beds of salt are known to exist at Spur, Dickens county; in the vicinity of Amarillo, Potter county, etc., as revealed by deep borings. The old salines in Smith county (Steen, Lindale and Brooks) have not been in operation for many years. (See under Smith county.)

The salt produced in Texas is from the evaporation of brines pumped from depths varying from 300 to 600 feet.

The following statement gives the annual production and value of salt from 1892 to the close of 1913:

Year	Barrels.	Value.
1892	121,250	$ 99,500
1893	126,000	110,267
1894	142,857	111,000
1895	125,000	55,000
1896 (Est.)	150,000	75,000
1897 (Est.)	225,500	122,750
1898	254,284	119,700
1899	312,436	204,330
1900 (Est.)	320,000	210,000

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Year.	Barrels.	Value.
1901 (Est.)	330,000	140,000
1902	347,906	143,683
1903	314,000	117,647
1904	376,695	149,246
1905	444,832	142,993
1906	360,733	170,559
1907	356,086	226,540
1908	442,571	255,652
1909	400,315	260,286
1910	382,164	272,568
1911	385,200	299,537
1912	373,064	290,228
1913	355,529	278,008
Total	6,646,422	$3,854,494

Sand and Gravel. Since 1905 to and including 1913, the amount of sand and gravel credited to the State is 5,300,697 tons of 2,000 pounds, valued at $2,743,496. The actual amount produced is certainly far greater than this, but we have no means of knowing how much greater it has been. It may well be twice as great. There are thousands of wagon loads of sand and gravel of which there is no record at all, nor can there be. Organized producers, who keep an account of their business, are able to report their output, but in the aggregate, unlisted and sporadic producers must handle a large tonnage.

By far the greater part of the sand is used in making concrete, mortar, etc., only a small proportion going to glass works. An unknown and unknowable part goes to the making of sand-clay roads.

A considerable part of the gravel goes for making concrete, for railroad ballast, etc., especially the washed gravel, whether of natural origin or prepared in a washery. Of recent years a very large proportion of the gravel produced, whether listed or not, has been used in the construction of roads.

With the general interest shown in the building of better roads it is likely that we shall see a large development of the gravel industry in many parts of the State. Macadam roads, built, in great part, of stone, are costly, although they are permanent, when given proper attention. Concrete roads require a great deal of gravel, but their cost is also high. For ordinary purposes, the best and cheapest roads in Texas will be built mainly of gravel, with a sub-course of rock when necessary.

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In order to meet the increasing demand for information concerning the quality of road making materials in this State, the Bureau of Economic Geology and Technology has equipped a complete laboratory for making all kinds of tests. No charge is made for this work. It is necessary only to send from 30 to 40 pounds of gravel, or sand, or stone, and to ask that the investigations be made.

The following statement gives the annual production and value of sand and gravel, 1905-1913. The greater part of the value is on account of the gravel, as out of a total value of $840,850 for 1912 and 1913, the value of the gravel was $473,692, or more than 56 per cent.

The annual production and value of sand and gravel in the State, 1905-1913, is as follows:

Year.	Tons of 2,000 lbs.	Value.
1905	75,000	146,462
1906	314,110	159,367
1907	283,484	149,294
1908	309,250	140,067
1909	676,506	246,365
1910	1,006,584	517,225
1911	1,048,352	543,866
1912	716,468	384,942
1913	870,943	455,908
Total	5,300,697	$2,743,496

Sandstone. Considering its resources in many varieties of sandstone, this State has not a large output to its credit. During the twenty-four years ending with 1913 the total value of the sandstone produced was $1,891,936, or about $79,000 a year. In only eight years of this period did the value reach $100,000.

Excellent sandstones occur in many counties, especially in Bexar, Burnet, Fayette, Lampasas, Lavaca, Tyler, Ward, etc. Most of the stone is of a clear gray color, but in Ward county, near Barstow, there is a good quarry of a reddish-brown stone that has been used to a considerable extent. One of the latest buildings to employ this stone is the addition to the Bexar county courthouse, San Antonio.

One of the best gray sandstones in the State occurs on both sides of the Colorado river at Chaddick's Mill, Lampasas county. This locality has afforded stone for local use, but now that the

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San Saba Branch of the Gulf, Colorado & Santa Fe Railway crosses the river immediately contiguous to some of the most favorable deposits, it would appear that this stone could come into more extensive use. The proportion of native stone used for buildings is not large, rip-rap and concrete accounting for the greater part. The following statement gives the production and value of the sandstone, 1889-1913:

The annual value of the sandstone produced in the State from 1889 to 1913, is as follows:

Year.	Value.
1889	$ 14,651
1891	6,000
1892	48,000
1893	77,675
1894	62,350
1895	97,336
1896	36,000
1897	30,000
1898	77,190
1899	35,738
1900	37,038
1901	111,568
1902	165,565
1903	114,381
1904	209,313
1905	123,281
1906	111,533
1907	108,047
1908	154,948
1909	61,600
1910	40,471
1911	28,000
1912	82,501
1913	58,750
Total	$1,891,936

Silver. With the exception of a little silver associated with lead ores in the Quitman mountains, El Paso county, and the Altuda district, Brewster county, the entire production of the State is credited to the Shafter district, Presidio county, 47 miles south and west from Marfa. The total amount appears to be 1,313,632 Troy ounces, valued at $7,171,214. For more than thirty years there has been an uninterrupted production at Shafter, where the ore is a silver chloride with more or less silver-bearing galena. Pan amalgamation was used until recently, when a cyanide plant was built. The underground works are extensive and now comprise more

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than forty miles of shafts, tunnels, levels, upraises, winzes and chambers. The deepest shaft is about 700 feet. The ore occurs in great chambers in a Carboniferous limestone, with but few surface indications. The silver-lead ore near Altuda, Brewster county, is held in a limestone of the same age as the Shafter deposits, but has not been developed to any considerable extent.

In the statement of the production of silver, no account is taken of the rich silver-copper ores which were obtained at the old Hazel mine, north of Val Horn, Culberson county, many years ago, and shipped to the El Paso smelter. Some of these ores are said to have carried as much as 2,000 ounces in silver per ton. Considerable operations were carried on there at one time, and of recent years attempts have been made to re-open the property. Aside from the silver value in the ores of that part of the Sierra Diablo, there are excellent copper ores as well. It is a long and tedious story to explain why such promising mining districts in Texas have not been developed. It is no part of our present purpose to do this. We merely call attention to the fact that they have not been developed, and this in spite of their known values. From the time when Von Streeruwitz first described these districts in the reports of the Texas Geological Survey, 1889-1892, to the present moment, there has been practically no systematic attempt to bring these ores into commercial use, if we except the operations at the Hazel mine, which are chiefly of historic interest.

The following statement gives the production and value of the silver, 1882-1913:

Year.	Production. Troy ozs.	Value.
1882-1886	155,039	$ 154,263
1887	193,798	189,534
1888	232,558	218,604
1889	324,165	303,418
1890	300,690	312,709
1891	375,000	370,500
1892	328,100	287,087
1893	349,400	272,530
1894	429,314	270,467
1895	450,000	292,850
1896	525,400	352,543
1897	404,700	241,970
1898	472,900	283,200
1899	520,000	312,000
1900	477,400	295,988
1901	472,400	284,040

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Year.	Production, Troy ozs.	Value.
1902	446,200	236,486
1903	454,400	245,376
1904	385,576	213,935
1905	412,200	234,054
1906	301,772	202,187
1907	305,300	201,500
1908	447,000	239,100
1909	408,100	212,200
1910	864,400	196,800
1911	444,200	239,900
1912	406,067	249,731
1913	427,553	258,242
Total	1,313,632	$7,171,214

Sulphur. To the close of the year 1913 the production of sulphur probably did not exceed 12,000 to 13,000 tons, valued at about $250,000. All of this came from the plant of the Freeport Sulphur Company, at the mouth of the Brazos river. The operations here are briefly described under Brazoria county. During the year 1914 the capacity of the Freeport plant was greatly increased, so that the production for 1914 will be much larger than for 1913. The present capacity is about 120,000 tons of sulphur a year, and Texas now ranks second, Louisiana being first. All of this sulphur comes from deposits lying 1,000 feet and more below the surface. It is obtained not through shafts but by forcing superheated water (and steam) through pipes, dissolving and suspending the sulphur and pumping it back.

There is another known area of sulphur where the material sets in practically at the surface and extends to unknown depths. The deepest pit, 41 feet, left off in material carrying 46 per cent in sulphur. Other pits, from 10 to 20 feet in depth, show masses of almost pure sulphur.

This area is in Culberson county, trans-Pecos Texas, from 40 to 50 miles northwest of Pecos and about the same distance north of Toyah.

Nearly twenty years ago St. Louis people built a sulphur-extracting plant in this field, and produced, it is said, two carloads of excellent sulphur. Nothing has been done since that time, although one of the reports made states that there are 300,000 tons of sulphur within forty feet of the surface, near Maverick Springs, Section 13, Block 113, Culberson county (formerly

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the eastern part of El Paso county). The nearest railroad point to these deposits would be about fourteen miles, Dixieland, or Riverton, on the branch of the Santa Fe system running north from Pecos, Reeves county.

It would appear that these deposits are well worth consideration (see further under Culberson county). The latest publication on the geology of that part of the State is the report of George B. Richardson, entitled "Reconnaissance in trans-Pecos Texas north of the Texas & Pacific Railway." This was published by the University Mineral Survey as its Bulletin No. 9, November, 1904, but has long been out of print. The field work was done in co-operation with the United States Geological Survey.

Tin.

A small amount of tin has been credited to Texas during the last few years, all of it from the deposits on the eastern side of the Franklin mountains in El Paso county, about sixteen miles north of El Paso. The entire production has been valued at $5,000.

The tin ore here is cassiterite (oxide of tin) and stannite, and it occurs in granite. Considerable lumps of extraordinary richness have been found on the surface, some of them assaying more than 40 per cent of tin. A small concentrating mill and smelter was built on the property several years ago, and some pig tin was made, but operations were not continued, and nothing further has been done for two or three years.

The scarcity of tin ore in the United States, the nearness of these deposits to railroad transportation (less than five miles to the Rock Island lines) and the fact that ore of extraordinary richness has been found here, would seem to render the situation of peculiar interest. The Franklin mountains have been subjected to a great erosion, and it is possible that prospecting shafts sunk near the foothills through the "wash" would come upon a workable deposit of stream tin. The ore is very heavy, and, under ordinary circumstances, would not travel far. It does not appear to be unduly mixed with other minerals of like density, so that the concentration should not offer any unusual difficulties.

Tin ore has also been reported from Mason county, in the vicinity of Willow creek and Herman's creek, a few miles east of

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the town of Mason. It is asserted that slag carrying particles of metallic tin has been found, indicating some ancient workings. This is an interesting statement, and is worthy of much more attention than has been given to it. The locality is about twenty-five miles west of Llano, the terminus of the Austin & Northwestern Railway (Sunset-Central System), and about the same distance southeast of Brady (Santa Fe and Frisco Systems). In the museum of the Bureau of Economic Geology and Technology at the University there is an excellent piece of tin ore, which is said to have come from Mason county. So far as concerns geological conditions favorable to the occurrence of tin ore, there is no reason for doubting that such ore has been found in Mason county, at this locality and also near Streeter.

Zinc.

The total amount of zinc credited to the State is valued at $55,832, all of it from El Paso county. The ore was "dry bone" (zinc carbonate). This same ore occurs, also, in Presidio county, two miles west of Shafter, where it is reported to exist in considerable quantities. It is also reported from the southern part of Brewster county, Boquillas district.

Zinc blende (sulphide of zinc) occurs northwest of Boracho, Culberson county; in association with silver, lead and copper ores in the Quitman mountains, El Paso county; and in association with ores of lead and copper, in Hooking Valley, nine miles west of the town of Burnet, Burnet county. At this latter locality it occurs in a gneissoid granite, and a good deal of prospecting work has been done during the last two years. An interesting, but seemingly sporadic, occurrence of zinc blende is near the town of St. Jo, in the eastern part of Montague county, in Cretaceous limestone. Of the known deposits of zinc ore those near Shafter, Presidio county, would appear to be the more important. The locality is about fifty miles from rail (Southern Pacific, at Marfa).

Texas Mineral Products, 1882-1886.

Clay products, estimated value	$ 1,500,000
Coal (including lignite), estimated, 500,000 tons	1,000,000
Iron ore, 33,100 tons	33,100
Pig iron, 12,400 tons, estimated value	248,000
Silver, 155,039 ounces, commercial value	154,263
All other products, including building stone, cement, gypsum, salt, etc., estimated	2,000,000
Total value for five years	$ 4,935,363

Note.—The value of the building stone used in the construction of the State Capitol is taken at $1,000,000 and is included in the above figures.

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Texas Mineral Products, 1887.

Clay products, estimated	$ 400,000
Coal and lignite, 75,000 short tons	150,000
Iron ore, 9,000 short tons	9,000
Lime, 80,000 barrels, estimated value	80,000
Pig iron, 3,900 long tons	78,000
Silver, 193,798 ounces, commercial value	189,534
All other products, including building stone, cement, gypsum, salt, etc., estimated	100.000
Total	$ 1,006,534

Texas Mineral Products, 1888.

Clay products, estimated value	$ 500,000
Coal and lignite, 90,000 short tons	184,500
Iron ore, estimated, 15,000 short tons	15,000
Lime, 129,475 barrels	125,000
Pig iron, 5,862 long tons	117,240
Silver, 232,558 ounces, commercial value	218,604
All other products, including building stone, cement, gypsum, salt, etc	125,000
Total	$ 1,255,344

Texas Mineral Products, 1889.

Clay products, estimated	$ 600,000
Coal and lignite, 128,216 short tons	340,617
Gold, value	6,828
Granite, value	22,550
Iron ore, 13,000 short tons	13,000
Lime, value	6,700
Limestone, value	217,835
Mineral waters, 213,700 gallons	10,354
Petroleum, 48 lbs., value	340
Pig iron, 4,044 long tons	80,880
Sandstone, value	14,651
Silver, 324,165 ounces, commercial value	303,418
All other products, including cement, gypsum, salt, etc.	143,300
Total	$ 1,760,473

Texas Mineral Products, 1890.

Cement, hydraulic, 40,000 barrels	$ 40,000
Clay products, estimated value	700,000
Coal and lignite, 184,440 short tons	465,900
Granite, value	22,550
Iron ore, 22,000 tons	22,000
Mineral waters, 298,200 gallons	16,040
Petroleum, 54 barrels	227
Pig iron, 9,669 long tons	193,380
Silver, 300,690 ounces, commercial value	312,709
All other products, estimated	200,000
Total	$ 1,992,806

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Texas Mineral Products, 1891.

Cement, hydraulic, 40,000 barrels	$ 40,000
Clay products, estimated	800,000
Coal and lignite, 172,100 short tons	412,360
Granite, value	75,000
Iron ore, 51,000 long tons	51,000
Limestone, value	175,000
Mineral waters, 271,410 gallons	23,132
Petroleum, 54 barrels	227
Pig iron, 18,602 long tons	372,040
Sandstone, value	6,000
Silver, 375,000 ounces, commercial value	370,500
All other products, estimated value	200,000
Total	$ 2,525,259

Texas Mineral Products, 1892.

Cement, hydraulic, 40,000 barrels	$ 40,000
Clay products, estimated value	900,000
Coal and lignite, 245,690 short tons	569,333
Granite, value	50,000
Iron ore, 24,903 long tons	24,000
Limestone, value	180,000
Mineral water, 405,400 gallons	24,535
Petroleum, 45 barrels	225
Pig iron, 8,613 long tons	172,260
Salt, 121,250 barrels	99,500
Sandstone, value	48,000
Silver, 328,100 ounces, commercial value	287,087
All other products, estimated value	200,000
Total	$ 3,295,240

Texas Mineral Products, 1893.

Cement, hydraulic, 10,000 barrels	$ 27,500
Clay products, estimated value	1,000,000
Coal and lignite, 302,206 short tons	688,407
Granite, value	38,991
Iron ore, 25,620 long tons	25,000
Limestone, value	28,100
Mineral waters, 359,070 gallons	21,957
Natural gas, value	500
Petroleum, 50 barrels	210
Pig iron, 6,215 long tons	124,300
Salt, 126,000 barrels	110,267
Sandstone, value	77,675
Silver, 349,400 ounces, commercial value	272,530
All other products, estimated	250,000
Total	$ 2,655,437

Texas Mineral Products, 1894.

Asphalt, 3,000 short tons	$ 45,000
Cement—Hydraulic, 12,000 barrels, $18,000; Portland, 8,000 barrels, $24,000	42,000
Clay products, value	1,028,853

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Coal and lignite, 420,848 short tons	976,458
Gold, 209 ounces	4,300
Gypsum, 6,925 short tons	27,300
Iron ore, 15,361 long tons	11,521
Lime, value	13,308
Limestone, value	41,526
Mineral waters, 1,857,950 gallons	162,220
Petroleum, 60 barrels	420
Pig iron, 4,671 long tons	93,420
Salt, 142,857 barrels	101,000
Sandstone, value	62,350
Silver, 429,314 ounces, commercial value	270,467
All other products, estimated	236,692
Total	$ 3,116,835

Texas Mineral Products, 1895.

Asphalt, 1,050 short tons	$ 10,000
Asphalt, crude rock, 3,500 short tons	17,500
Cement—Hydraulic, 10,000 barrels, $17,000; Portland, 10,000 barrels, $30,000	47,000
Clay products, value	1,030,446
Coal and lignite, 484,959 short tons	725,000
Gypsum, 10,750 short tons	36,511
Iron ore, 8,371 long tons	6,278
Lime, value	30,700
Limestone, value	62,526
Mineral waters, 1,479,5[illegible]0 gallons	72,100
Petroleum, 50 barrels	350
Pig iron, 4,682 long tons	93,640
Salt, 125,000 barrels	55,000
Sandstone, value	97,336
Silver, 450,000 ounces, commercial value	292,850
All other products, estimated	269,300
Total	$ 2,856,537

Texas Mineral Products, 1896.

Asphalt, crude rock, 5,000 tons	$ 25,000
Cement—Hydraulic, 12,000 barrels, $18,000; Portland, 8,000 barrels, $24,000	42,000
Clay products—Brick and tile, $857,672; pottery, $58,081	915,753
Coal and lignite, 544,015 short tons	896,251
Gold, 387 ounces	8,000
Gypsum, 16,022 short tons	25,000
Iron ore, 4,771 long tons	3,583
Lime, value	60,000
Limestone, value	77,252
Mineral waters, 4,005,912 gallons	172,138
Petroleum, 1,450 barrels	4,000
Pig iron, 1,221 long tons	24,420
Salt, estimated 150,000 barrels	75,000
Sandstone, value	36,000
Silver, 525,400 ounces, commercial value	352,543
All other products, estimated	240,000
Total	$ 2,956,940

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Texas Mineral Products, 1897.

Asphalt, 65 short tons	$ 650
Cement—Hydraulic, 11,390 barrels, $17,085; Portland, 7,779 barrels, $23,334	40,419
Clay products — Brick and tile, $1,134,829; pottery, $62,210	1,197,039
Coal and lignite, 639,341 short tons	972,323
Gold, 358 ounces	7,400
Granite, value	3,500
Gypsum, 24,454 short tons	65,651
Iron ore, 13,588 long tons	13,588
Lime, value	21,862
Limestone, value	57,258
Mineral waters, 2,060,292 gallons	38,745
Petroleum, 65,975 barrels	65,975
Pig iron, 6,175 long tons	123,500
Salt, estimated, 225,500 barrels	122,750
Sandstone, value	30,000
Silver, 404,700 ounces, commercial value	241,970
All other products, estimated	328,138
Total	$ 3,330,798

Texas Mineral Products, 1898.

Asphalt, 80 short tons	$ 1,000
Cement—Hydraulic, 11,000 barrels, $16,500; Portland, 8,000 barrels, $24,000	40,500
Clay products—Brick and tile, $631,738; pottery, $55,342; miscellaneous, $71,131	758,211
Coal and lignite, 686,734 short tons	1,139,763
Granite, value	4,685
Gypsum, 34,215 short tons	58,130
Iron ore, 9,705 tons	3,882
Lime, value	38,531
Limestone, value	70,321
Mineral waters, 842,100 gallons	25,120
Petroleum, 546,070 barrels	382,249
Pig iron, 5,178 long tons	103,560
Salt, 254,284 barrels	119,700
Sandstone, value	77,190
Silver, 472,900 ounces, commercial value	283,200
All other products, estimated	311,469
Total	$ 3,417,511

Texas Mineral Products, 1899.

Cement—Hydraulic, 12,000 barrels	$ 12,400
Clay products—Brick and tile, $1,139,067; pottery, $82,052	1,221,119
Coal and lignite, 883,832 short tons	1,334,895
Gold, 334 ounces	6,900
Granite, value	84,945
Gypsum, 53,773 short tons	110,000
Iron ore, 14,729 tons	14,729
Lime, value	79,399
Limestone, value	100,025

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Mineral waters, 4,729,950 gallons	155,047
Petroleum, 669,013 barrels	473,443
Pig iron, 5,803 long tons	116,060
Quicksilver, 1,000 flasks	42,000
Salt, 312,436 barrels	204,330
Sandstone, value	35,738
Silver, 520,000 ounces, commercial value	312,000
All other products, estimated	270,601
Total	$ 4,573,631

Texas Mineral Products, 1900.

Cement—Hydraulic, 17,000 barrels, $28,900; Portland, 26,000 barrels, $52,000	$ 80,900
Clay products—Brick and tile, $1,083,553; pottery, $87,464	1,171,017
Coal and lignite, 968,373 short tons	1,581,914
Gold, 53 ounces	1,100
Granite, value	76,069
Gypsum, 50,000 short tons	100,000
Iron ore, 16,881 long tons	16,881
Lime, value	79,659
Limestone, value	124,728
Mineral waters, 5,438,700 gallons	209,991
Natural gas, value	20,000
Petroleum, 836,039 barrels	871,996
Pig iron, 10,150 long tons	203,000
Quicksilver, 1,800 flasks	75,600
Salt, 320,000 barrels, estimated	210,000
Sandstone, value	37,038
Silver, 477,400 ounces, commercial value	295,988
All other products, estimated	320,340
Total	$ 5,316,222

Texas Mineral Products, 1901.

Cement, Portland (including one plant in South Dakota)	$ 215,327
Clay products—Brick and tile, $1,632,189; pottery, $91,186	1,723,375
Coal and lignite, 1,107,953 short tons	1,907,024
Gold, 29 ounces	600
Granite, value	27,005
Iron ore, estimated value	5,000
Lime, value	93,587
Limestone, value	209,658
Mineral waters, 6,651,750 gallons	180,503
Natural gas, value	18,577
Petroleum, 4,393,658 barrels	1,247,351
Pig iron, 2,273 long tons	45,460
Quicksilver, 2,932 flasks	132,438
Salt, estimated value	140,000
Sandstone, value	111,568
Silver, 472,400 ounces, commercial value	284,040
All other products, estimated	306,413
Total	$ 6,647,926

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Texas Mineral Products, 1902.

Cement—Hydraulic, 17,000 barrels, $28,900; Portland, 165,500 barrels, $234,950	$ 263,850
Clay products—Brick and tile, $1,595,612; pottery $98,202	1,693,814
Coal and lignite, 901,912 short tons	1,477,245
Granite, value	60,000
Gypsum, estimated	100,000
Iron ore, 6,516 tons	6,434
Lime, value	82,500
Limestone, value	228,662
Mineral waters, 6,568,550 gallons	362,446
Natural gas, value	14,953
Petroleum, 18,083,658 barrels	3,998,097
Quicksilver, 5,319 flasks	239,350
Salt, 347,906 barrels	143,683
Sandstone, value	165,565
Silver, 446,200 ounces, commercial value	236,486
All other products, estimated	317,500
Total	$ 9,390,585

Texas Mineral Products, 1903.

Asphalt, 2,158 short tons	$ 30,550
Clay products—Brick and tile, $1,374,914; pottery, $100,531	1,475,445
Clay, raw, value	2,865
Coal and lignite, 926,759 short tons	1,505,383
Coal tar, 154,629 gallons	13,373
Coal gas, 131,610,100 cubic feet	205,949
Gas coke, 8,755 short tons	50,112
Granite, value	173,325
Iron ore, 34,050 long tons	34,050
Lime, value	74,038
Limestone, value	262,053
Mineral waters, 939,390 gallons	53,613
Natural gas, value	13,851
Petroleum, 17,955,572 barrels	7,517,479
Pig iron, 11,653 long tons	233,060
Quicksilver, 5,029 flasks	211,218
Salt, 314,000 barrels	117,647
Sandstone, value	114,381
Silver, 454,400 ounces, commercial value	245,376
All other products, estimated	325,962
Total	$12,766,865

Texas Mineral Products, 1904.

Asphalt, 3 short tons	$ 60
Clay products—Brick and tile, $1,429,596; pottery, $106,501	1,536,097
Coal and lignite, 1,195,944 short tons	1,983,636
Coal tar, 185,364 gallons	13,838
Coal gas, 139,190,500 cubic feet	211,962
Gas coke, 10,114 short tons	60,895
Gold, 9 ounces	186

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Granite, value	348,317
Gypsum, estimated value	100,000
Iron ore, estimated value	12,000
Lime, 35,318 short tons	141,500
Limestone, value	387,061
Mineral waters, 1,142,500 gallons	64,923
Natural gas (including Alabama), value	14,082
Petroleum, 22,241,413 barrels	8,156,220
Quicksilver, 5,336 flasks	232,116
Salt, 376,695 barrels	149,246
Sand, 9,958 short tons	6,783
Sandstone, value	209,313
Silver, 385,576 ounces, commercial value	213,935
Strontium sulphate (celestite), 17 short tons	500
All other products, estimated	400,000
Total	$14,353,270

Texas Mineral Products, 1905.

Clay products — Brick and tile, $1,618,157; pottery, $100,788	$ 1,718,945
Coal and lignite, 1,200,684 short tons	1,968,558
Gold, 12 ounces	248
Granite, value	132,193
Gypsum, estimated	100,000
Lime, 31,984 short tons	142,470
Limestone, value	171,847
Mineral waters, 1,526,970 gallons	144,421
Natural gas, estimated	14,000
Petroleum, 28,136,189 barrels	7,552,262
Quicksilver, 4,723 flasks	172,362
Salt, 444,832 barrels	142,993
Sand and gravel, value	146,462
Sandstone, value	123,281
Silver, 417,200 ounces	234,054
All other products, including cement, iron ore, pig iron, etc.	987,250
Total	$13,752,346

Texas Mineral Products, 1906.

Asphalt, 24,900 short tons	$ 306,750
Clay products — Brick and tile, $1,860,963; pottery, $108,635	1,969,598
Clay, raw, 3,167 short tons	5,984
Coal and lignite, 1,312,873 short tons	2,178,901
Coal tar, 236,341 gallons; coal gas, 166,917,672 cubic feet; gas coke, 11,984 short tons	355,560
Copper, pounds, 51,377	9,916
Gold, 77 ounces	1,592
Granite, value	168,061
Gypsum, estimated	100,000
Iron ore, 36,660 long tons	36,660
Lime, 41,183 short tons	192,527
Limestone, value	239,125
Mineral waters, 1,045,315 gallons	122,085

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Natural gas (including Alabama and Louisiana)	150,695
Petroleum, 12,567,897 barrels	6,565,578
Quicksilver, 4,761 flasks	178,829
Salt, 360,733 barrels	170,559
Sand and gravel, 314,110 short tons	159,367
Sandstone, value	111,533
Silver, 301,772 ounces, commercial value	202,187
Zinc, 8 short tons	976
All other products	1,524,554
Total	**$14,751,037**

Texas Mineral Products, 1907.

Asphalt, 53,649 short tons	$ 929,857
Clay products (brick, tile and pottery)	2,557,561
Coal and lignite, 1,648,069 short tons	2,778,811
Gold, 48 ounces	1,000
Granite, value	122,158
Lead, 10 short tons	1,060
Lime, 38,101 short tons	186,372
Limestone, value	267,757
Mineral waters, 1,146,279 gallons	152,233
Natural gas (including Alabama and Louisiana)	178,276
Petroleum, 12,322,696 barrels	10,410,865
Quicksilver, 3,686 flasks	148,387
Salt, 356,086 barrels	226,540
Sand and gravel, 283,484 short tons	142,294
Sandstone, value	108,047
Silver, 305,300 ounces, commercial value	201,500
Zinc, 16 short tons	1,888
All other products	1,391,854
Total	**$19,806,458**

Texas Mineral Products, 1908.

Asphalt, 17,167 short tons	$ 350,440
Clay products (brick, tile and pottery)	2,066,735
Coal and lignite, 1,895,377 short tons	3,419,481
Gold, 24 ounces	500
Granite, value	190,055
Lead, 42 short tons	3,528
Lime, 33,725 short tons	144,118
Limestone, value	314,571
Mineral waters, 1,586,634 gallons	151,032
Petroleum, 11,206,464 barrels	6,700,708
Quicksilver, 2,384 flasks	122,260
Salt, 442,571 barrels	255,652
Sand and gravel, 309,250 short tons	140,067
Sandstone, value	154,948
Silver, 447,000 ounces, commercial value	239,100
All other products	959,734
Total	**$15,212,929**

Note.—The production of iron ore in 1908 was 55,966 tons valued at $30,663.

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Texas Mineral Products, 1909.

	Quantity.	Value
Asphalt, short tons	46,304	$ 857,204
Cement, Portland, barrels	656,361	808,997
Clay products		3,148,463
Coal, short tons	1,112,228	2,539,064
Copper, pounds	3,456	449
Gems and precious stones		234
Gold, fine ounces, Troy	19	400
Granite, value		173,271
Lead, short tons	42	3,612
Lignite, short tons	712,212	602,881
Lime, short tons	53,578	244,845
Limestone, value		341,528
Mineral waters, gallons sold	1,033,476	98,499
Natural gas, not separately reported.		
Petroleum, barrels	9,534,467	6,793,050
Quicksilver, flasks	4,188	194,084
Salt, barrels	400,315	260,286
Sand and gravel, short tons	676,506	246,365
Sandstone, value		61,600
Silver, fine ounces, Troy	408,100	212,200
Other products		1,207,174
Total		$17,217,807

Note.—Other products include natural cement, fuller's earth, gypsum, natural gas, pig iron, sand-lime brick.

Texas Mineral Products, 1910.

	Quantity.	Value
Asphalt, short tons	57,713	$ 1,040,825
Cement, Portland, barrels	1,292,445	1,643,729
Clay products		2,863,930
Coal, short tons	1,010,944	2,397,858
Copper, pounds	2,961	376
Gems and precious stones, etc.		834
Gold, ounces, Troy	19	400
Granite, value		66,909
Lead, short tons	33	2,904
Lignite, short tons	881,232	763,107
Lime, short tons	48,200	226,952
Limestone, value		447,239
Mineral waters, gallons sold	1,241,248	128,549
*Natural gas, cubic feet		
Petroleum, barrels	8,899,266	6,605,755
Quicksilver, flasks	3,320	154,413
Salt, barrels	382,164	272,568
Sand and gravel, short tons	1,006,584	517,225
Sandstone, value		40,471
Silver, fine ounces, Troy	364,400	196,800
All other		1,012,607
Total		$18,383,451

*In 1910 the production of natural gas was included in that of Louisiana and Alabama.

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Texas Mineral Products, 1911.

	Quantity.	Value
Asphalt, short tons	55,826	$ 786,785
Cement, Portland, barrels	1,700,000	1,785,000
Clay products		2,669,399
Coal, short tons	1,007,695	2,491,361
Copper, pounds	105	12
Gems and precious stones, est.		1,000
Gold, fine ounces, Troy	189	3,900
Granite, value		70,488
Lead, short tons	57	513
Lignite, short tons	870,206	781,927
Lime, short tons	43,064	218,007
Limestone, value		490,289
Mineral waters, gallons sold	1,637,932	158,367
Natural gas, cubic feet	5,503,393,000	1,014,945
Petroleum, barrels	9,526,474	6,554,552
Quicksilver, flasks, est.	2,000	84,000
Salt, barrels	385,200	299,537
Sand and gravel, short tons	1,048,352	543,866
Sandstone, value		28,000
Silver, fine ounces, Troy	444,200	239,900
All other		595,456
Total		$18,817,304

Texas Mineral Products, 1912.

	Quantity.	Value
Asphalt, short tons	94,530	$ 1,40[illegible]4,266
Cement, barrels	1,762,780	2,062[illegible]124
Clay products		2,892,[illegible]510
Coal, short tons	1,083,952	2,491,3[illegible]61
Copper, pounds	721	1[illegible]9
Gems and precious stones		14[illegible]
Gold, fine ounces, Troy	3	63
Granite, value		67,613
Gypsum, short tons	160,863	356,579
Lead, short tons	33	2,939
Lignite, short tons	990,705	880,788
Lime, short tons	45,529	236,101
Limestone, value		530,251
Mineral waters, gallons sold	1,292,992	151,395
Natural gas, cubic feet	7,470,373,000	1,405,077
Petroleum, barrels	11,735,057	8,852,713
Quicksilver, flasks, est.	2,700	114,750
Salt, barrels	373,064	290,228
Sand and gravel, short tons	716,468	384,942
Sandstone, value		82,501
Silver, fine ounces, Troy	406,067	249,731
Zinc, short tons	119	16,422
Miscellaneous		161,894
Total		$22,797,015

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Texas Mineral Products, 1918.

	Quantity.	Value
Asphalt, short tons	122,026	$ 1,970,354
Cement, barrels	2,108,737	2,663,063
Clay products		3,049,349
Coal, short tons	1,197,907	2,774,956
Copper, pounds	34,665	5,373
Gems and precious stones		344
Gold, Troy ounces	16	340
Granite, value		76,067
Gypsum, short tons	161,090	345,749
Iron ore, long tons	27,000	27,000
Lead, short tons	113	9,910
Lignite, short tons	1,144,515	1,104,759
Lime, short tons	45,897	255,893
Limestone, value		590,289
Mineral waters, gallons	1,187,612	132,488
Natural gas, cubic feet	12,159,755,000	2,073,823
Petroleum, barrels	15,009,478	14,675,593
Quicksilver, flask, est.	2,700	108,000
Salt, barrels	355,529	278,008
Sand and gravel, short tons	870,943	455,908
Sandstone, value		58,750
Silver, Troy ounces	427,553	258,242
Sulphur, short tons	12,000	240,000
Zinc, short tons	326	36,546
Miscellaneous		441,901
Total		$31,666,910

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CHAPTER II.

DISCUSSION OF COUNTIES.

Anderson-Duval.

Before discussing the mineral resources of the several counties, some explanation may be necessary in respect of the plan pursued.

It has not been the intention to list every mineral or mineral resource within each county, for this would be an almost endless task and unprofitable withal. The purpose has been to consider such things as now appear to be of commercial value or within commercial possibilities. It is realized that important discoveries may be made at any time, especially in petroleum and natural gas. Furthermore, the progress of industrial chemistry, with all of its allied sciences, is so rapid that what is today of no special value may be of considerable value tomorrow. Take, for instance, the Doremus process for the extraction of alumina from highly aluminous clays, relatively free of iron. Up to the present time the chief source of alumina (from which metallic aluminum, and salts of alumina are made) has been certain well known bauxites, from Georgia, Alabama, Arkansas, etc. These bauxites are required to carry about 60 per cent of alumina soluble in sulphuric acid and to have a low content in iron. Such clays are scarce, and the industry of mining and preparing them has been restricted to favored localities.

The Doremus process, however, using hydrofluoric acid, promises to bring into use aluminous clays not necessarily soluble in sulphuric acid, nor of as high a content in alumina. We have in Texas no known deposits of bauxite, but we have very large deposits of highly aluminous clays almost free of iron. These clays may come into use as a source of alumina.

As another instance, take Ichthyol, a medicinal preparation made from pyropissit (a variety of brown coal, or lignite) or natural asphalt. It may be found that this substance can be made from asphaltic limestone or asphaltic sandstone, of which we have large supplies in Texas.

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The deposits of celestite (sulphate of strontium) in this state are known to be of exceptional purity, but they are not now utilized.

In speaking of mineral resources, one must bear in mind that not everything listed may now be of value, for the requirements of trade, distances from transportation, etc., must be considered.

It would be a man unmindful of the conditions of modern progress who would venture to say that such and such things are not to be ranked among mineral resources because they are not now utilized. If one is to err, it is better to err as a conservative optimist rather than as a progressive pessimist.

It is to be regretted that we have so little information about large areas in Texas. Many of the more populous counties, already within easy reach of transportation, are showing marked progress. During the last ten years the value of our mineral products has risen from $14,353,270 to $31,666,910. Since 1908 the value has more than doubled. This increase has not been due to the value of metals or metallic ores, but to the common things that minister more particularly to every day life.

But there is in Texas today a total area of more than 64,000 square miles (a territory larger than the state of Missouri) concerning which our information is so meager that for all practical purposes we must consider its mineral resources as unknown. This area comprises 67 counties with a total population of 194,043 and with 1,718 miles of railroads. It represents 25 per cent of the total area of the state, 5 per cent of the population, and 11 per cent of the railroad mileage. Nearly all of this domain is in the western and northwestern part of the state, a region now being penetrated by several lines of railroad.

It may be that most of these counties are not within any known mineral belt, as the term is usually employed, but they have the liveliest interest in the most important of all minerals—that is, *water*. No fund derived from public taxation could be expended to better advantage than in the study of water conditions in those counties, but this very matter has received scant attention. The only systematic study of this most important matter that has been attemped for many years was begun by this Bureau in Hale county in the fall of 1914. This work will be continued as funds are supplied, for we realize that it is a

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vital question and one that should receive the most careful consideration.

The property valuation and railroad mileage are for the year 1913.

The elevations given for the county towns and those given in the long list of elevations have been derived from various sources, such as the list given in "Gazetteer of Texas," published by the United States Geological Survey; data supplied by railroads, by private observers, etc. They are thought to be substantially correct. The figures given are feet above sea level.

The elevations of hills, mountains, mountain ranges, etc., are taken, for the most part, from the topographic sheets of the United States Geological Survey. Our authority for the statement that El Capitan, Guadalupe mountains, Culberson county, is the highest point in Texas is the El Paso Folio of that Survey. This peak probably exceeds the height of Old Baldy, Jeff Davis county, by 300 to 400 feet.

The latitude, longitude and magnetic declination are taken from the reports of the United States Coast and Geodetic Survey, the magnetic declination being corrected to the year 1905, unless otherwise stated. The declination is east and varies from 7 deg. 1 min., at Orange, in the extreme southeastern part of the state, to 12 deg. 33 min., at Dimmit, Castro county, in the southwest part of the Panhandle. At El Paso, which is considerable further west, the declination is 12 deg. 3 min.

The population is from the census of 1910, unless otherwise stated.

ANDERSON COUNTY.

Location—Northeast of center; between the Trinity and the Neches rivers.

County seat—Palestine; population, 11,413; elevation, 495 ft.; lat. 31° 47′; long. 95° 38′; mag, dec. 7° 51′.

Area, square miles, 1,060.

Population, 29,650.

Railroads, 3.

Miles of railroad, 58.75.

Assessed valuation of property of all kinds, $13,688,660.

Mineral resources—Asphalt rocks; clays; iron ore; lignite; limestone; salt; gravel.

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The asphalt rocks of Anderson county are bituminous sandstones. They occur at distances varying from ten to thirteen miles northeast of Palestine. Samples from three separate localities were examined by the University Mineral Survey, with the following results:

Analyses of Bituminous Sandstones from Anderson County

	Chapel well. Per cent	Haswell well. Per cent.	Brule's Hole. Per cent.
Asphaltene	11.25	0.92	2.35
Petrolene	12.09	16.52	5.82
Silica	76.71	81.60	91.83
Sulphur	0.43	0.61	0.18
Total bitumen	23.34	17.44	8.17

With the exception of the rock from the old tar well, Jasper county, the bituminous sandstone from the Chapel well contains more bitumen than any rock we have examined.

There are excellent clays in Anderson county, but they have not been fully investigated.

Northwest of Palestine there is an area of iron ore covering about ten square miles. The ore is of the laminated variety (limonite, brown hematite) and showed the following average composition:

	Per cent.
Metallic iron	44.62
Silica	11.17
Alumina	13.51
Phosphorus	0.49

There is a much smaller area to the east of this, while to the north there is an area considerably larger, viz., about fifteen square miles. In this larger area the ore is laminated and gave the following analysis:

	Per cent.
Metallic iron	48.65
Silica	11.35
Alumina	8.00
Phosphorus	0.24

There are other iron ore areas in Anderson county, especially on the high divide between Still's creek and Ionic creek, where the area is about nineteen square miles. The laminated ores here had the following average composition:

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	Per cent.
Metallic iron	46.61
Silica	10.72
Alumina	10.11
Phosphorus, trace to	0.30

These ores are in the central-west part of the county, around Fosterville, Nechesville, etc. South of Palestine the iron ores seem to be more siliceous, and, consequently, of less value. The iron ore area appears to cover 47 square miles.

The lignite area in Anderson county occupies a large part of the county, but no mining operations are carried on. On Caddo creek, about seventeen miles northeast of Palestine, where there is an outcrop of lignite two feet thick, the lignite had the following composition:

	Per cent.
Moisture	8.35
Volatile combustible matter	41.28
Fixed carbon	42.73
Ash	7.64
	100.00
Sulphur	1.24

The limestones in Anderson county occur six miles west of Palestine, at Salt City (old Saline). The stone here is white, chalky, and fossiliferous, with seams of yellow calcite. The age is Upper Cretaceous, although the surrounding territory is Tertiary. The following analysis represents this stone:

	Per cent.
Silica	3.28
Alumina	2.93
Oxide of iron	1.07
Lime	50.72
Magnesia	None
Carbonic acid	38.30
Loss on ignition	3.80
	100.10

A considerable salt plant is in operation at Salt City, using brines.

ANDREWS COUNTY.

Location—West Texas, borders on New Mexico.

County seat—Andrews; population, no returns for 1910.

Area, square miles, 1,590.

Population, 975.

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Railroads, none.

Assessed valuation of property of all kinds, $2,387,860.

Mineral resources—Practically unknown. Salt occurs in shallow basins and as deposits from old lakes.

ANGELINA COUNTY.

Location—East Texas; between the Neches and the Angelina rivers.

County seat — Lufkin; population, 2,749; elev. 323; lat. 31° 21′; long. 94° 44′; mag. dec. 7° 44′.

Area, square miles, 880.

Population, 17,705.

Railroads, 7.

Miles of railroad, 159.

Assessed valuation of property of all kinds, $10,078,407.

Mineral resources — Clays; iron ore; lignite; petroleum?; natural gas?; gravel; asphaltic sandstone.

While there are many excellent clays in Angelina county, they have not been fully investigated. The same may be said of the lignite (brown coal), although some analyses may be given. A brown coal, almost like pitch coal, from the Angelina river, had the following composition:

	Per cent.
Moisture	12.15
Volatile combustible matter	37.14
Fixed carbon	41.19
Ash	6.50
Sulphur	3.02
	100.00

It was said to be hard and firm, black and with a luster like pitch.

Other brown coal from Angelina county had the following composition:

	Per cent.
Moisture	12.50
Volatile combustible matter	36.37
Fixed carbon	37.77
Ash	13.46
	100.00

But little is known of the iron ore deposits in this county, or of the oil and natural gas.

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ARANSAS COUNTY.

Location—Southeast Texas; borders on the Gulf of Mexico.
County seat—Rockport; population, 1,382; elev. 6.
Area, square miles, 295.
Population, 2,106.
Railroads, 2.
Miles of railroad, 10.77.
Assessed valuation of property of all kinds, $2,893,718.
Mineral resources—Clays; gravel.

The mineral resources of Aransas county have not been investigated, but as it lies wholly within the Gulf Coastal Plain, it may contain both petroleum and natural gas.

ARCHER COUNTY.

Location—North Texas.
County seat—Archer City; population, 825; elev. 1,085.
Area, square miles, 960.
Population, 6,525.
Railroads, 4.
Miles of railroad, 75.17.
Assessed valuation of property of all kinds, $6,869,114.
Mineral resources—Clays; copper ore; petroleum; sandstone; gravel.

No large oil wells have been brought in in Archer county, but the geological conditions are such as to warrant further drilling.

The Permian copper ores occur in many places throughout the county, especially at the old Isbell property, north of Archer City. Some of these ores, especially the nodular variety of chalcocite, are rich in copper, running as high as 50 to 60 per cent. Except in the way of sporadic and small shipments, these ores have not been utilized. Whether or no they can be profitably worked remains to be seen, but it would appear that when copper ore of less than one per cent in copper is now being mined, by steam shovel, in New Mexico, the Archer county deposits should be worthy of close investigation. The high content in copper would allow of the mining and handling of a heavy overburden, and the specific gravity of the ore is such as to render concentration a comparatively easy problem.

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ARMSTRONG COUNTY.

Location—Southern part of Panhandle.

County seat — Claude; population, 692; elev. 3,405; lat. 35° 8′; long. 101° 23′; mag. dec. 10° 58′.

Area, square miles, 870.

Population, 2,682.

Railroads, 1.

Miles of railroad, 32.72.

Assessed valuation of property of all kinds, $4,558,141.

Mineral resources—Clays; gypsum; gravel.

The mineral resources of Armstrong county have not been investigated.

ATASCOSA COUNTY.

Location—South Texas.

County seat—Pleasanton; population, 420; elev. 365.

Area, square miles, 1,182.

Population, 10,004.

Railroads, 3.

Miles of railroad, 79.83.

Assessed valuation of property of all kinds, $10,431,750.

Mineral resources—Clays; lignite; sandstone; gravel; natural gas.

The clays of Atascosa county have not been investigated.

The average composition of the lignite that has been mined at Poteet is as follows:

	Per cent.
Moisture	27.94
Volatile combustible matter	24.67
Fixed carbon	37.13
Ash	10.26
	100.00
Sulphur	1.04
British thermal units per pound	8,322

From some of the artesian wells that have been drilled in the county there is sufficient natural gas obtained to be used locally for heating, etc.

AUSTIN COUNTY.

Location—Southeast Texas; west of Brazos river.

County seat — Bellville; population, 1,076; elev. 265; lat. 29° 56′; long. 96° 13′; mag. dec. 8° 11′.

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Area, square miles, 712.
Population, 17,699.
Railroads, 4.
Miles of railroad, 90.52.
Assessed valuation of property of all kinds, $9,459,333.
Mineral resources—Clays; gravel.
The mineral resources of Austin county have not been investigated.

BAILEY COUNTY (Unorganized).

Location—West Texas; borders on New Mexico.
County seat—
Area, square miles, 1,000.
Population, 312.
Railroads, 1.
Miles of railroad, 19.68.
Assessed valuation of property of all kinds, $299,958.
Mineral resources—Practically unknown.

BANDERA COUNTY.

Location—Southwest of center.
County seat — Bandera; population, 419; elev. 1,258; lat. 29° 44′; long. 99° 5′; mag. dec. 8° 45′.
Area, square miles, 822.
Population, 4,921 (inclusive of 184 sq. ms. now in Real County, created in 1913).
Railroads, none.
Assessed valuation of property of all kinds, $2,785,235 (inclusive of 184 sq. ms. now in Real county).
Mineral resources—Clays; limestone; kaolin, reported; gravel.
The mineral resources of Bandera county have not been investigated.

BASTROP COUNTY.

Location—Southeast of center.
County seat—Bastrop; population, 1,709; elev. 368; lat. 30° 6′; long. 97° 18′; mag. dec. 8° 40′.
Area, square miles, 881.
Population, 25,344.
Railroads, 2.
Miles of railroad, 94.63.

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Assessed valuation of property of all kinds, $13,642,198.

Mineral resources—Clays; lignite; gravel; petroleum?

The clays of Bastrop county have long been famous for their excellent qualities, and they are extensively used for the manufacture of all kinds of brick, including fire brick. Some of the largest brick plants in the State are located in this county, and place on the market more than forty varieties of products. Through the courtesy of the Elgin-Butler Brick and Tile Company, the Elgin Standard Brick Company, and the Texas Fire Brick Company, in supplying the brick for the tests, the Bureau of Economic Geology examined a considerable number of brick made in Bastrop county.

The examinations included, among other items, the determination of the weight per cubic foot deduced (from the specific gravity), the per cent of cells by volume, the volume of cells in 100 parts by weight, the percentage weight of water absorbed and the crushing strain in pounds per square inch. The analyses were made by S. H. Worrell and J. E. Stullken. The following table gives the results obtained.

Tests on Brick Made in Bastrop County.

Color.	Marks Shade	Quality	Anal. No.	Weight per cu. ft., lbs.	Per ct. cells by vol.	Vol. of cells in 100 pts. by wt.	Lbs. of water absorbed per cu. ft.	Crushed at lbs. per sq. in.
	Elgin-Butler Brick & Tile Company.							
Brown	485	1	1211	120.78	22.49	11.62	14.03	4,844
Buff	110	1	1210	114.29	28.39	15.50	17.71	3,866
Buff spot	220	1	1212	121.16	21.72	11.19	13.55	5,067
Buff spot	210	1	1232	118.50	25.70	13.53	16.03	4,911
Gray	425	1	1216	121.40	22.19	11.41	13.85	5,333
Gray	440	1	1217	118.50	24.28	12.79	15.16	3,476
Gray	485	1	1218	117.90	24.69	13.07	15.40	4,560
Gray	481	1	1241	115.80	26.13	14.08	16.30	2,954
Gray	490	1	1242	124.60	19.66	9.86	12.28	5,570
Gray buff	105B	1	1434	119.30	24.35	12.74	15.09	4,787
Gray spot	218	1	1214	115.16	27.21	14.48	16.67	4,879
Gray spot	215	1	1437	121.90	22.12	11.32	13.79	4,911
Dark gray	430	1	1433	119.60	23.12	12.06	14.42	5,496
Light gray	415	1	1435	120.40	23.55	12.21	14.70	1,223
Light gray	410	1	1436	117.80	27.45	14.54	17.12	4,486
Iron speckled	120	1	1239	126.10	17.08	8.41	10.60	6,491
Manganese speckled	225	1	1240	125.30	18.93	9.43	11.81	5,787
Iron spot	125	1	1430	126.80	17.82	8.77	11.12	5,390
Iron spot	115	1	1431	119.00	24.25	12.72	15.13	4,539
White mottled	237	1	1215	127.77	14.71	7.19	9.18	4,840
	Elgin Standard Brick Company.							
Buff speck	360	1	1364	122.20	21.58	11.02	13.46	5,096
Buff speck	326	1	1365	118.70	23.90	12.57	14.92	5,479
Gray	640	1	1366	123.30	20.70	10.48	13.92	6,321

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The quality of the brick made in Bastrop county is further illustrated by samples received from the Texas Fire Brick Company, Dallas, with plant at Lasher.

	Buff Manganese, Shade 460	Buff, Shade 77
Weight of a cu. ft., pounds	118.60	168.72
Per cent. of cells by volume	23.04	26.26
Volume of cells in 100 parts by weight	12.12	9.72
Pounds of water absorbed per cu. ft.	14.37	16.39
Crushed at, lbs. per square inch	4,410	3,850

The average composition of two samples of fire-clay from near Elgin is as follows:

	Per cent.
Silica	68.45
Alumina	21.10
Oxide of iron	1.10
Lime	1.40
Magnesia	Trace
Soda	1.25
Potash	Trace
Titanic acid	0.05
Water	6.75
	100.10
Total fluxes	3.75

The fusion point of these clays was about 3,000 degrees F.

A pottery clay from near McDade had the following composition:

	Per cent.
Silica	74.30
Alumina	16.00
Oxide of iron	1.40
Lime	Trace
Magnesia	None
Soda	0.60
Potash	0.50
Titanic acid	0.50
Water	5.07
	99.60
Total fluxes	2.50
Point of fusion	3,038 degrees F.

The composition of a sample of red and brown burning clay for common and pressed brick, from Elgin, was as follows:

	Per cent.
Silica	70.40
Alumina	17.30
Oxide of iron	1.80

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	Per cent.
Lime	1.00
Magnesia	Trace
Soda	2.20
Potash	0.60
Titanic acid	0.80
Water	5.40
	99.50
Total fluxes	5.60

This clay became viscous at a temperature of 2,498 deg. F.

A sandy brick clay from Elgin had the following composition:

	Per cent.
Silica	72.70
Alumina	9.50
Oxide of iron	4.10
Lime	4.10
Magnesia	0.80
Soda	Trace
Potash	2.40
Titanic acid	0.60
Water	4.50
	99.10
Total fluxes	11.04

This clay became viscous at a temperature of 2,390 degrees F.

The lignite of Bastrop county has been mined extensively by the Independence Mining Company, at Phelan. The average composition of this material is as follows:

	Per cent.
Moisture	30.98
Volatile combustible matter	34.93
Fixed carbon	27.67
Ash	6.42
	100.00
Sulphur	0.60
British thermal units per lb	7,597

The Calvin Coal Company also mines lignite in this county, but no analysis can be given. The same is true of the Standard Company.

BAYLOR COUNTY.

Location—North Texas.

County seat—Seymour; population, 2,029; elev. 1,290; lat. 33° 36′; long. 99° 16′; mag. dec. 9° 55′.

Area, square miles, 957.

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Population, 8,411.

Railroads, 3.

Miles of railroad, 57.73.

Assessed valuation of property of all kinds, $6,249,391.

Mineral resources—Copper ore; gypsum; sandstone; gravel.

Permian copper ores occur in Baylor county, but they have not been developed.

BEE COUNTY.

Location—Southeast Texas.

County seat — Beeville; population, 3,269; elev. 214; lat. 28° 23′; long. 97° 46′; mag. dec. 8° 55′

Area, square miles, 875.

Population, 12,090.

Railroads, 2.

Miles of railroad, 62.45.

Assessed valuation of property of all kinds, $8,461,725.

Mineral resources—Clays; gravel.

The mineral resources of Bee county have not been investigated.

BELL COUNTY.

Location—Central Texas.

County seat—Belton; population, 4,164; elev. 511; lat. 31° 4′; long. 97° 28′; mag. dec. 8° 11′.

Area, square miles, 1,091.

Population, 49,186.

Railroads, 3.

Miles of railroad, 98.

Assessed valuation of property of all kinds, $29,669,830.

Mineral resources—Clays; limestone; mineral waters; gravel; petroleum; natural gas.

The clays of Bell county are utilized in the manufacture of brick by the Belton Brick Company, Belton. They are classed as calcareous clays, and the average composition of two samples was as follows:

	Per cent.
Silica	64.80
Alumina	3.63
Oxide of iron	1.57
Lime	13.16
Magnesia	0.90
Soda	0.77

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	Per cent.
Potash	0.45
Titanic acid	0.45
Water	2.60
Carbonic acid	11.05
	99.72
Total fluxes	16.86

These clays do not burn steel hard at a temperature of 2,246 degrees F.

We have examined one sample of brick from the Belton Brick Company, with the following results:

Weight in lbs. per cu. foot	102.60
Per cent. of cells by volume	28.92
Volume of cells in 100 parts by weight	17.60
Pounds of water absorbed per cu. ft.	18.25
Crushed at, lbs. per square in.	3,008

BEXAR COUNTY.

Location—South of center.

County seat—San Antonio; population (1913-14), 115,065; elev. 656; lat. 29° 29′; long. 98° 32′; mag. dec. 9° 35′.

Area, square miles, 1,268.

Population, 119,676.

Railroads, 6.

Miles of railroad, 185.69.

Assessed valuation of property of all kinds, $105,898,862.

Mineral resources — Cement materials; clays; lignite; limestone; natural gas; petroleum; phosphatic pebbles; sandstone; mineral waters; infusorial earth; gravel.

The cement making materials in Bexar county (limestone and shale) are utilized by the San Antonio Portland Cement Company, whose plant is on the International & Great Northern Railway, about five miles north of San Antonio.

Analyses of the crude materials are as follows:

	Limestone Per cent.	Shale Per cent.
Silica	7.80	55.30
Alumina	3.45	13.56
Oxide of iron	1.35	4.50
Lime	46.64	9.48
Magnesia	None	None
Carbonic acid	36.65	7.45
Loss on ignition	3.35	8.85
	99.24	99.14

The lignite in Bexar county is not now utilized.

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Of limestones there are many varieties in Bexar county, from a soft, somewhat friable and chalk-like stone, to material which closely resembles lithographic stone. By far the greater development of the limestones is along the line of the San Antonio & Aransas Pass Railway northwest of San Antonio and around Leon Springs.

Analyses of some of these limestones are as follows:

	Leon Sprgs. (3)	Near Helotes.	Balcones, used in Federal Bldg. San Antonio.
Silica	1.80	0.38	1.40
Alumina	2.48	1.55	0.24
Oxide of iron	0.65	0.45	0.76
Lime	51.23	52.43	51.92
Magnesia	0.16	0.25	Trace
Carbonic acid	39.48	41.20	41.36
Loss on ignition	4.14	2.54	2.92
	99.94	98.80	98.60

The stone from the Balcones, used in the construction of the Federal Building in San Antonio, had the following physical qualities:

Weight of a cubic foot, pounds	133.00
Per cent. of cells by volume	19.09
Volume of cells in 100 parts by wt.	8.96
Pounds of water absorbed per cu. ft.	11.91
Crushed at, lbs. per square inch	2,425

A sample of limestone received from the San Antonio Lime Company and representing material in a quarry 14 miles north of San Antonio, and on the S. A. & A. P. Railway, had the following composition:

	Per cent.
Silica	0.70
Alumina	0.28
Oxide of iron	0.72
Lime	55.05
Carbonic acid	41.90
Loss on ignition	2.10
	100.00

The physical qualities of this stone were as follows:

Weight of a cubic foot, pounds	167.60
Per cent. of cells by volume	0.20
Volume of cells in 100 parts by weight	0.07
Pounds of water absorbed per cu. ft.	0.11
Crushed at pounds per square inch	6,666

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From Ling & Hughes, San Antonio, we received a sample of limestone from Bexar county which had the following composition:

	Per cent.
Silica	4.60
Alumina and oxide of iron	3.90
Lime	51.12
Magnesia	None
Carbonic acid	39.88
	99.50

This stone had the following physical properties:

Weight per cubic foot, pounds	128.25
Pounds of water absorbed per cubic foot	12.83
Crushed at pounds per square inch	4,400

The fire-clays are represented by one analysis of the clay from Adkins, as follows:

	Per cent.
Silica	69.70
Alumina	21.50
Oxide of iron	0.40
Lime	Trace
Magnesia	0.50
Soda	1.00
Potash	0.30
Titanic acid	0.12
Water	7.10
	100.62
Total fluxes	2.32
Fusion point, deg. F	3,038

The pottery clays are represented by two analyses, as follows:

	Myer Pottery, Strumberg. Per cent.	2½ mi. south of Elmendorf. Per cent.
Silica	65.64	68.30
Alumina	20.48	20.10
Oxide of iron	1.44	1.00
Lime	1.70	Trace
Magnesia	0.32	2.40
Soda	0.60	0.60
Potash	1.00	Trace
Titanic acid	0.27	1.20
Water	7.50	6.60
	98.95	100.20
Total fluxes	5.06	4.00
Fusion point, deg. F	3,038	3,038

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Bexar county clays of easy fusibility are represented by the following analyses of two samples from San Antonio:

	1	2
Silica	38.08	57.04
Alumina	11.36	11.85
Oxide of iron	2.60	3.02
Lime	23.70	9.56
Magnesia	Trace	1.20
Soda	1.60	2.01
Potash	0.58	0.75
Titanic acid	0.70	1.13
Water	3.06	4.00
Carbonic acid	18.80	8.00
	100.48	98.56
Total fluxes	28.48	16.54

These clays began to be viscous at a temperature of 2,174 deg. F.

The buff-burning, semi-refractory clays are represented by an analysis of a sample from Adkins, as follows:

	Per cent.
Silica	68.70
Alumina	15.90
Oxide of iron	3.30
Lime	3.10
Magnesia	0.50
Soda	0.30
Potash	Trace
Titanic acid	1.40
Water	5.90
	99.10
Total fluxes	7.20
Becomes viscous at, deg. F	2,570

The red and brown-burning clays for common and pressed brick are represented by an analysis of a sample from San Antonio, as follows:

	Per cent.
Silica	59.47
Alumina	18.24
Oxide of iron	4.77
Lime	4.30
Magnesia	Trace
Soda	0.24
Potash	Trace
Titanic acid	1.14
Water	5.70
Carbonic acid	3.25

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	Per cent.
Sulphuric acid	0.90
Organic matter	0.55
	98.56
Total fluxes	9.31
Becomes viscous at about, deg. F	2,300

The brick made in Bexar county, at Elmendorf, by the Star Clay Products Company, is represented by sample of stiff mud Star fire-brick, the physical tests of which are as follows:

Weight of a cubic foot, pounds	126.7
Per cent. of cells by volume	17.61
Volume of cells in 100 parts by weight	8.67
Pounds of water absorbed per cu. ft	10.98
Crushed at, pounds per square inch	5,330

A sample of dry press fire-brick from the same company had the following physical properties:

Weight of a cubic foot, pounds	115.5
Per cent. of cells by volume	25.94
Volume of cells in 100 parts by weight	14.02
Pounds of water absorbed per cu. ft	16.18
Crushed at, pounds per square inch	2,685

On Leon creek, about 7 miles west of San Antonio, on the Castroville road, there is a heavy deposit of phosphatic green sand of the following composition:

	Per cent.
Silica	35.18
Alumina	5.30
Oxide of iron	17.25
Lime	16.00
Magnesia	Trace
Soda	1.39
Potash	1.69
Carbonic acid	8.00
Loss on ignition	10.10
Phosphoric acid	3.30
	98.21

This deposit contains rounded phosphatic pebbles, from ⅛-inch to ¼-inch in diameter, of the following composition:

	Per cent.
Silica	7.50
Alumina	31.03
Oxide of iron	4.58
Lime	18.08
Carbonic acid	4.60
Phosphoric acid	18.19
Loss on ignition	12.60
	98.34

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The larger pebbles are not abundant. For the most part the pebbles are very small, less than 1-20 inch in diameter.

An examination of 10 feet of this phosphatic green sand foot by foot gave the following results, from above downwards:

	Phosphoric acid. Per cent.
First foot	3.09
Second foot	2.38
Third foot	3.22
Fourth foot	3.07
Fifth foot	4.00
Sixth foot	2.73
Seventh foot	4.32
Eighth foot	2.60
Ninth foot	3.70
Tenth foot	3.97
Average	3.30

The total thickness of the deposit is about 20 feet, and it sets in at from 4 to 6 feet below the surface.

Taking the deposit as a whole, it carries enough lime, potash and phosphoric acid to make it a good fertilizing agent. The rock is soft and easily pulverized. It could be finely ground and used with distinct advantage on many farm lands in south Texas, especially those in the vicinity of San Antonio. With the exception of some "stray" phosphate in Fayette county, the exact locality of which is somewhat uncertain, the phosphatic pebbles from Leon creek carry considerably more phosphoric acid than any other known deposit in the State.

There are no commercial developments of natural gas in Bexar county, although the possibilities along the San Antonio and Medina rivers are such as to warrant much more extensive and systematic drilling than has heretofore been carried on. This is especially true of the country along the Medina river from near its junction with the San Antonio river to Somerset. Good rock-pressures have been observed in some wells bored along this line.

The proximity of this district, 15 to 25 miles, to the largest city in Texas would of itself appear to justify careful investigations of the situation with respect to both natural gas and petroleum. The oil wells near Somerset now supply crude oil for a refinery in San Antonio.

The Dullnig wells, which formerly yielded small amounts of

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a good lubricating oil, are not in production now. At one time that oil brought $5.00 a barrel, an attractive price for crude oil.

The quality of the sand-lime brick made at San Antonio is represented by the following tests made on a sample received from the manufacturers:

Weight per cubic foot, pounds	116.1
Per cent. of cells by volume	27.44
Volume of cells in 100 parts by weight	14.75
Pounds of water absorbed per cubic foot	17.12
Crushed at, pounds per square inch	2,115

The composition of Dullnig's chalybeate water is as follows:

	Grains per U. S. Gallon.
Magnesium sulphate	56.213
Sodium chloride	25.213
Ferrous bi-carbonate	3.021
Calcium bi-carbonate	44.374
Calcium sulphate	7,960
Strontium bi-carbonate	Trace
Sodium sulphate	7.190
Ammonium nitrate	Trace
Magnesium phosphate	Trace
Organic matter	None
	144.228

Analysis by James Kennedy, School of Pharmacy, University of Texas.

The composition of the mineral water from San José (Terrell Hot Well) is as follows:

	Grains per U. S. Gallon.
Silica	1.336
Alumina	0.088
Iron bicarbonate	0.076
Calcium sulphate	77.241
Calcium bicarbonate	0.612
Calcium chloride	55.523
Calcium phosphate	0.326
Sodium bromide	0.464
Sodium biborate	0.326
Sodium iodide	0.352
Sodium sulphate	83.104
Potassium sulphate	4.326
Magnesium chloride	26.304
Lithium	0.222
Strontium sulphate	0.104
	230.404
Carbonic acid gas	40.78 cu. in. per gallon
Hydrogen sulphide gas	9.59 cu. in. per gallon

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Analysis by W. A. Noyes, Rose Polytechnic Institute, Terre Haute, Indiana.

BLANCO COUNTY.

Location—South of center.

County seat—Johnson City; population, 344; elev. 1,200.

Area, square miles, 762.

Population, 4,311.

Railroads, none.

Assessed valuation of property of all kinds, $3,113,944.

Mineral resources—Bat guano; clays; limestone; sandstone; gravel.

Bat guano occurs in many limestone caves and caverns in Blanco county. It is of variable composition. The best bat guano contains from 10 to 12 per cent of ammonia, weighs from 40 to 45 pounds per cubic foot and is worth about $2.00 per unit of ammonia, delivered at fertilizer factories.

BORDEN COUNTY.

Location—West Texas; southeast of Staked Plains.

County seat—Gail; population, 275.

Area, square miles, 892.

Population, 1,386.

Railroads, none.

Assessed valuation of property of all kinds, $1,526,540.

Mineral resources—Unknown.

BOSQUE COUNTY.

Location—Northeast of center.

County seat—Meridian; population, 718; elev. 791; lat. 31° 57′; long. 97° 40′; mag. dec. 8°32′.

Area, square miles, 972.

Population, 19,013.

Railroads, 2.

Miles of railroad, 78.56.

Assessed valuation of property of all kinds, $11,978,670.

Mineral resources—Clays; limestone; gravel; petroleum; natural gas.

The clays of Bosque county have not been investigated.

We received from Mr. Bart Moore Jr., of the McCall-Moore

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Engineering Company, Waco, a sample of limestone from 1½ miles west of Iredell, which had the following composition:

	Per cent.
Silica	6.10
Alumina	1.88
Oxide of iron	0.78
Lime	48.69
Magnesia	None
Carbonic acid	38.20
Loss on ignition	3.30
	98.95

This stone had the following physical qualities:

Weight per cubic foot, pounds	157.1
Per cent. of cells by volume	5.24
Volume of cells in 100 parts by weight	2.08
Pounds of water absorbed per cu. ft.	3.26
Crushed at, pounds per square inch	3,750

BOWIE COUNTY.

Location—Northeast corner; borders on Arkansas and Louisiana.

County seat—Boston; population, 140; elev. —; lat. 33° 27′; long. 94° 24′; mag. dec. 7° 48′ (1912).

Area, square miles, 904.

Population, 34,827.

Railroads, 5.

Miles of railroad, 118.51.

Assessed valuation of property of all kinds, $15,691,768.

Mineral resources—Clays; lignite; mineral waters; gravel.

The fire-clays are represented by an analysis of a sample from New Boston, as follows:

	Per cent.
Silica	73.68
Alumina	17.01
Oxide of iron	0.50
Lime	0.08
Magnesia	1.36
Soda	0.15
Potash	Trace
Titanic acid	1.57
Water	6.00
	100.35
Total fluxes	2.09
Point of fusion, about	3.200 deg. F.

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The pottery clays are represented by an analysis of a sample from Texarkana, as follows:

	Per cent.
Silica	71.20
Alumina	18.00
Oxide of iron	0.60
Lime	Trace
Magnesia	2.00
Soda	0.30
Potash	0.90
Titanic acid	0.70
Water	5.80
	99.50
Total fluxes	3.80
Point of fusion	3,038 deg. F.

The red and brown-burning clays for common and pressed brick are represented by an analysis of a sample from New Boston, as follows:

	Per cent.
Silica	66.01
Alumina	18.82
Oxide of iron	6.38
Lime	0.55
Magnesia	1.88
Soda	0.08
Potash	0.16
Titanic acid	0.95
Water	4.80
	99.58
Total fluxes	9.00
Becomes viscous at	2,246 deg. F.

The sandy brick clays are represented by an analysis of a sample from Texarkana, as follows:

	Per cent.
Silica	88.71
Alumina	4.88
Oxide of iron	2.00
Lime	0.30
Magnesia	0.97
Soda	Trace
Potash	Trace
Titanic acid	0.90
Water	2.28
	100.04
Total fluxes	3.27

The various clays are utilized on a large scale, especially for common brick, tiles, hollowware, etc.

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The lignites are not now utilized. The average of three analyses of lignite from the county is as follows:

	Per cent.
Moisture	12.39
Volatile combustible matter	52.82
Fixed carbon	26.36
Ash	8.43
	100.00
Sulphur	0.67
British thermal units per pound (1)	10,370

The thickness of a seam of lignite near New Boston is 12 feet. A notable circumstance in connection with the lignites of this county is that one analysis showed 1.45 per cent of ash, 76.41 per cent of volatile combustible matter, and 10.62 per cent of fixed carbon.

BRAZORIA COUNTY.

Location—Southeast Texas; borders on the Gulf of Mexico.

County seat—Angleton; population, 898; elev. 31; lat. 29° 9′; long. 95° 25′; mag. dec. 7° 54′.

Area, square miles, 1,438.

Population, 13,299.

Railroads, 6.

Miles of railroad, 141.96.

Assessed valuation of property of all kinds, $18,346,755.

Mineral resources—Clays; petroleum; sulphur; gravel.

The clays have not been investigated. There are no producing petroleum or natural gas wells in the county, although it is reasonable to suppose that both petroleum and natural gas will be found there in commercial quantities.

A large establishment for the production of sulphur from beds lying a thousand feet below the surface has been built at Freeport, mouth of the Brazos river, and the capacity is now about 120,000 tons a year.

There is reason to believe that this is a very large deposit of sulphur. A costly plant was built after thorough investigations over a number of years. The method of extraction is similar to that used at Sulphur, Louisiana, viz: by forcing superheated water through pipes into the deposit, suspending and

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dissolving the sulphur and then pumping the material back and allowing the sulphur to deposit in open air bins. A pure sulphur is thus obtained, which is in steady demand for the manufacture of sulphuric acid, powder, sulphite for bleaching wood-pulp, etc. The only two plants for producing sulphur in this manner are on the Gulf Coast, one at Sulphur, Louisiana, and the other at Freeport, Texas. The two together have an annual capacity of nearly 750,000 tons of sulphur.

BRAZOS COUNTY.

Location—Southeast of center; between the Brazos and the Navasota rivers.

County seat—Bryan; population, 4,132; elev. 367; lat. 30° 40′; long. 96° 21′; mag. dec. 8° 53′.

Area, square miles, 510.

Population, 18,919.

Railroads, 5.

Miles of railroad, 97.70.

Assessed valuation of property of all kinds, $9,705,156.

Mineral resources—Clays; lignite; petroleum; sandstone; gravel.

The clays have not been fully investigated. A clay of easy fusibility occurs about 12 miles southeast of College Station. It had the following composition:

	Per cent.
Silica	68.56
Alumina	18.53
Oxide of iron	0.72
Lime	0.60
Magnesia	0.12
Soda	2.72
Potash	2.27
Titanic acid	0.43
Water	7.00
	100.95
Total fluxes	6.43

The lignite has not been developed. There are known deposits 15 miles north of Navasota, Grimes county, and these may extend into Brazos county. At this locality a well bored to a depth of 200 feet showed the following section:

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Depth below surface. Feet.	Thickness of lignite, Feet.
12	2
34	2½
38	2
41	7
52	10
177	23½

At the Black Shoals (Niblitz), northwestern part of the county, a seam of brown coal occurs in the bank of the Brazos river. It is shaly near the top, but is compact at the bottom and has a thickness of 12 to 14 feet. This deposit extends also into Burleson county.

There are no producing oil or gas wells in Brazos county.

BREWSTER COUNTY.

Location—Trans-Pecos Texas; borders on the Rio Grande.

County seat—Alpine; population, 800; elev. 4,481; lat. 30° 22′; long. 103° 40′; mag. dec. 10° 18′.

Area, square miles, 5,006.

Population, 5,220.

Railroads, 2.

Miles of railroad, 115.75.

Assessed valuation of property of all kinds, $8,439,882.

Mineral resources—Clays; coal; granite; lignite; lead; limestone; marble; opal; petroleum; quicksilver; silver ores; gold; manganese ores; topaz; zinc ores?

The mineral resources of Brewster county are quite varied, but at the present time the only mineral product worthy of mention is the quicksilver from the southern part. The quicksilver area lies about 90 miles south of Alpine and centers around Terlingua postoffice. The total value of the quicksilver produced in Brewster county up to the present time is more than $2,200,000. There are no better quicksilver ores in the United States than are to be found in the southern part of this county.

The clays have not been developed, but at the time of the building of the quicksilver furnaces there was considerable activity at Harry Dryden's brickyard on Terlingua creek, in the southern part of the county. The brick made here was used for

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building the quicksilver furnaces, and it had the following physical properties:

Weight of a cubic foot, pounds	101.3
Per cent. of cells by volume	33.46
Volume of cells in 100 parts by weight	20.63
Pounds of water absorbed per cu. ft	20.89
Crushed at, pounds per square inch	1,496

The coal in this county occurs in the southern part and has been used as fuel under steam boilers at the quicksilver furnaces. Three analyses may be given as representing the coal in this district:

	Cub Spring.	Kimble Pits.	Chisos Pen.
Moisture	10.65	4.74	1.16
Vol. combustible matter	50.91	29.84	32.79
Fixed carbon	19.52	49.84	44.53
Ash	18.92	15.58	21.52
	100.00	100.00	100.00
Sulphur	0.86	1.26	3.39
British thermal units per lb.	8,432	11,887	11,950

An excellent granite not yet developed is found 2½ to 3 miles south of Altuda. Near Altuda, at the old Bird & Caruthers mine, good silver lead ore has been mined, but there are no operations at present. Ore from this place has yielded as high as $100 a ton in lead and silver.

South of Marathon, about 16 miles, there is a quartz which carries in places about $4 a ton in gold.

Five miles south of Marathon an excellent manganese ore has been found, but has not been developed.

Six miles southwest of Marathon, oil has been found at a depth of 90 feet, and it rose 14 feet in the well. The yield was 7 barrels in 14 hours. It is possible that the area around Marathon may be found to be oil-bearing in a commercial sense. The 1,200-foot well drilled 6 miles northwest of Marathon did not yield oil or gas in commercial amounts.

About 14 miles west of Alpine and nearly the same distance south of the Southern Pacific Railroad, there is a beautiful white marble with a faint bluish tinge and a black marble with white markings. The locality is known as the Jordan quarry. A sample of the white marble from this locality had a weight of 130.41 pounds per cubic foot and one cubic foot ab-

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sorbed 5.42 ounces of water. This stone crushed at 3,784 pounds per square inch.

The black marble from this locality has a weight of 170.35 pounds per cubic foot. One cubic foot absorbed 4.36 ounces of water, and the stone crushed at 10,420 pounds per square inch. The chemical composition of these two stones is as follows:

	White marble.	Black marble.
Silica	2.00	3.40
Alumina	0.25	0.50
Oxide of iron	0.15	0.25
Lime	54.10	54.00
Carbonic acid	42.15	42.00
	99.25	100.66

Beautiful agates, amethysts and opals have been found in this county, together with many varieties of chalcedony.

East of Maverick Mountain, about 90 miles south of Alpine, in Section 120, Block G4, excellent samples of nitrate of potash have been found. The locality is interesting from a scientific standpoint, but does not appear to afford commercial possibilities. The nitrate occurs as thin veins in and encrustations on a porous gray sandstone of Cretaceous age.

Native alum has been found near Ash Spring, western foothills of the Chisos Mountains, but it does not seem to occur in commercial quantities.

BRISCOE COUNTY.

Location—South of the Panhandle.

County seat—Silverton; population, 525; elev. 3,300; lat. 34° 28′; long. 101° 23′; mag. dec. 10° 36′.

Area, square miles, 850.

Population, 2,162.

Railroads (1913), none.

Assessed valuation of property of all kinds, $2,581,837.

Mineral resources—Unknown.

BROOKS COUNTY.

Location—South Texas.

County seat—Falfurrias; population, 750; elev. 119.

Area, square miles, 1,964.

Population, no official statistics. County created in 1911.

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Railroads, 1.

Miles of railroad, 3.20.

Assessed valuation of property of all kinds, $3,395,202 (inclusive of 1,052 sq. ms. in Jim Hogg County).

Mineral resources—Unknown.

BROWN COUNTY.

Location—Northwest of center.

County seat—Brownwood; population, 6,967; elev. 1,342; lat. 31° 44′; long. 98° 59′; mag. dec. 9° 18′.

Area, square miles, 911.

Population, 22,935.

Railroads, 3.

Miles of railroad, 86.03.

Assessed valuation of property of all kinds, $11,493,835.

Mineral resources—Clays; coal; limestone; natural gas; petroleum; sandstone; gravel.

The clays have not been investigated.

Lignite occurs in the county, but this has not been developed. A typical form of lignite, showing carbonized woody fiber, jet black in color, had the following composition:

	Per cent.
Moisture	18.04
Volatile combustible matter	44.91
Fixed carbon	35.83
Ash	1.23
	100.00
Sulphur	1.77
British thermal units per pound	10,794

Petroleum and natural gas occur in the northwest part of the county on Holloway Mountain, but no commercial wells have been brought in. The natural gas wells at Bangs supply the town of Brownwood with natural gas.

At the close of the year 1913 there were four good gas wells in Brown county.

BURLESON COUNTY.

Location—Southeast of center, west of the Brazos river.

County seat—Caldwell; population, 1,476; elev. 406; lat. 30° 32′; long. 96° 46′; mag. dec. 8° 33′.

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Area, square miles, 677.

Population, 18,687.

Railroads, 2.

Miles of railroad, 68.60.

Assessed valuation of property of all kinds, $8,175,100.

Mineral resources—Clays; fuller's earth; lignite; gravel.

The clays have not been investigated. Lignite is known to occur in the county, but there are no developed mines, nor can any analyses be given.

There are excellent deposits of fuller's earth in Burleson county, but they have not been utilized to any considerable extent.

A sample of fuller's earth from Somerville gave J. C. Blake (A. and M. College) a bleaching power of 152 as compared with English earth at 100, for bleaching refined cotton seed oil.

In a private communication from J. R. Lyon, Lyons, he reports that he had had many pits dug on a 100-acre tract and that the thickness of the fuller's earth varied from 4 to 30 feet. Tests of the earth made by Armour & Co., Fort Worth, were most favorable. Under date of November 7, 1914, R. A. Brantly, manager of the Fuller's Earth Company, Somerville, writes that they now have a representative visiting the principal cotton oil refiners in the United States with the purpose of acquainting them with the character of material that can be furnished. For bleaching vegetable oils this earth is said to be of excellent quality.

BURNET COUNTY.

Location—Near center (south).

County seat—Burnet; population, 981; elev. 1,294; lat. 30° 45′; long. 98° 13′; mag. dec. 9° 4′.

Area, square miles, 1,010.

Population, 10,765.

Railroads, 1.

Miles of railroad, 60.82.

Assessed valuation of property of all kinds, $8,102,807.

Mineral resources — Asphalt rock; bat guano; copper ore; granite; graphite; lead ore; limestone; marble; sandstone; silver ore; zinc ore; granite gravel.

The mineral resources of Burnet county are quite varied, but

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at the present time only the granite is utilized. There are many beautiful varieties of granite in the county: red, light gray, dark gray, and bluish gray. The great deposit of coarse red granite at Granite Mountain has been worked for a number of years, and supplied the stone used in the construction of the Capitol Building at Austin. The quality of the granite from Granite Mountain was determined as early as 1881 by Colonel D. W. Flagler, U. S. A., at the Rock Island Arsenal, Rock Island, Illinois. It was then ascertained that the crushing strength in pounds per square inch was 11,891; that it absorbed an inappreciable amount of water, and that the weight in pounds per cubic foot was 163.64. Since that time other analyses have been made of the Granite Mountain stone, and the weight of a cubic foot was found to be 165 pounds, with a crushing strain of 13,400 to 15,225 pounds per square inch.

A sample of coarse red granite from the old Hoover quarry, east side of the Colorado river, which was used in the construction of the Tarrant county court house, Fort Worth, had the following physical properties:

Crushed at, pounds per square inch.....13,365

A sample of dark gray granite from a quarry northwest of Burnet had a weight of 182.83 pounds per cubic foot, and crushed at 10,880 pounds per square inch.

A sample of light gray granite from the same locality had a weight of 170.97 pounds per cubic foot, and crushed at 9,340 pounds per square inch.

Near Marble Falls there are large deposits of a granite gravel mixed with clay which makes an excellent road material.

A bituminous limestone occurs on and near Post Mountain, near the town of Burnet. It had the following composition:

	Per cent.	
	From.	To.
Asphaltene	1.90	7.76
Petrolene	6.75	8.40
Carbonate of lime.....	81.33	88.20
Silica	1.50	4.16
Sulphur	0.22	0.23
Total bitumen.....	10.30	14.51

There is to be found at this locality a bituminous limestone which corresponds closely in composition to the famous Seyssel

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rock of southeast France. This material occurs also north of Burnet.

There is a thin seam of coal on a creek tributary to the Colorado river below Marble Falls. The composition of this coal is as follows:

	Per cent.
Moisture	3.72
Volatile combustible matter	42.27
Fixed carbon	39.41
Ash	14.60
	100.00

This coal does not seem to be of commercial importance.

Copper ore associated with lead and zinc is found in the Hooking Valley, about 9 miles west of Burnet, and has been partly developed.

The marble has not been developed, although there are some localities from which a stone of good quality can be obtained.

In many parts of the county and within easy reach of railroad facilities, there are large deposits of limestone of varying composition and qualities.

Many analyses and tests have been made in our laboratory, and the following eleven are selected as representative of the localities sampled:

	..	2	3	4	5	6	7	8	9	10	11
Silica	1.50	26.64	43.10	1.58	30.10	5.04	29.20	12.50	7.77	6.00	13.76
Alumina	------	0.43	5.65	0.65	4.58	2.01	2.05	1.26	0.05	1.04	1.91
Ox. iron	1.50	3.18	3.32	0.91	1.82	1.35	4.95	2.40	4.25	3.60	4.57
Lime	53.27	38.16	22.26	50.74	33.66	50.04	31.82	45.07	45.38	41.76	39.60
Magnesia	------	------	1.12	0.93	------	------	0.62	0.22	2.36	5.94	1.06
Sulph. acid	------	------	------	0.49	0.54	------	0.27	0.21	------	------	0.59
Carb. acid	41.85	30.40	19.10	40.66	28.10	39.74	26.32	35.30	38.70	39.38	29.50
Loss on ign.	2.00	1.80	5.50	2.62	0.20	1.66	3.18	1.80	1.20	2.64	6.70
	100.12	100.60	100.05	98.58	99.00	99.64	98.41	98.76	99.71	100.36	97.69
Wt. per cu. ft. lbs.	168	165	165	165	165	168	168	168	168	172	168
Lbs. water absorbed per cu. ft.	0.26	0.67	1.67	1.50	0.72	0.52	0.44	0.31	0.76	0.42	1.58
Crushed at lbs. per sq. in.	11,965	24,500	19,950	16,250	17,700	11,000	15,425	18,860	10,040	17,000	12,475

Explanation.

1. Widow Holland's ranch, about 1½ miles southeast of Burnet. East side of Amazon creek and about ¾ mile east of the A. & N. W. Ry. Heavy exposure.
2. Backbone Ridge (Lacy's pasture), about ½ mile east of the A. & N. W. Ry., where the creek cuts through the ridge. About 1¼ miles north of railroad station at Marble Falls. Heavy exposure.

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3. About a mile northeast of the A. & N. W. Ry. station at Marble Falls and ½ mile east of the High School Building. Heavy exposure.
4. R. H. Hoover. About a mile south of Delaware water-tank, A. & N. W. Ry. Heavy exposure.
5. Reed Yett. About ¼ mile north of the A. & N. W. Ry. and about 1½ miles east of Fairland. Heavy exposure.
6. A. H. Edwards. About a mile east of the A. & N. W. Ry and about 1½ miles southeast of Fairland. Heavy exposure.
7. Hoover's Point. A. & N. W. Ry., about 1¼ miles east of Colorado river bridge.
8. Ferguson place. Within half a mile of the A. & N. W. Ry., near Fairland. Heavy exposure. Said to be an excellent stone for bitulithic paving.
9. Same as 8, but sampled at a different place on the hill.
10. Near Wood's sandstone quarry. Left hand creek. Heavy exposure. About a third of a mile from end of railroad to quarry.
11. From cut on A. & N. W. Ry., a mile south of Delaware water-tank. Exposure 4 feet.

The dolomites of Burnet County are also well developed within easy distances of the A. & N. W. Ry. The following five analyses and tests show the composition and qualities at the several localities noted:

	1	2	3	4	5
Silica	5.00	3.00	3.33	4.30	3.32
Alumina	2.54		5.43	8.48	12.88
Oxide of iron	1.96	1.80	3.18	1.82	2.88
Lime	30.32	28.98	29.38	27.03	28.62
Magnesia	15.14	20.40	14.32	14.99	10.81
Carbonic acid	40.47	43.70	42.00	41.70	40.00
Loss on ignition	4.49	2.46	3.00	2.60	0.58
	99.92	100.34	100.64	100.92	99.09
Weight per cu. ft. lbs.	175	175	175	175	175
Lbs. water absorbed per cu. ft.	0.29	0.59	0.35	1.03	0.46
Crushed at lbs. per sq. in.	26,250	18,450	25,000	18.650	26,000

Explanation.

1. Bryant ranch, about ¾ mile down Hamilton creek below Holland spring, about 3 miles south of Burnet and ¾ mile east of the A. & N. W. Ry. Heavy exposure.
2. Dave Holland. About a mile south of the A. & N. W. Ry. and about 1¾ miles southeast of Fairland. Heavy exposure.
3. R. H. Hoover. About ½ mile east of the A. & N. W. Ry. and about 6 miles east of Fairland. East side of Hamilton creek about ¾ mile below pumping station. Heavy exposure.
4. E. O. Wengren. About ½ miles east of the A. & N. W. Ry. and about 6 miles east of Fairland. About ¼ mile up Hamilton creek from its junction with Delaware creek. Heavy exposure.
5. Reed Yett. About ½ mile east of the A. & N. W. Ry. and about 5 miles east of Fairland, below bridge over Honey creek. Heavy exposure.

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There is a deposit of lithographic stone in Burnet county about 4 miles north of the A. & N. W. Ry. bridge across the Colorado river. Some attempts have been made to develop this stone, but none of late. A good lithograph of the court house in Burnet was made on this stone. The locality is worth close attention as a good lithographic stone, large enough for the demands of the trade, is not abundant.

A deposit of graphite, foliated and amorphous, also occurs in the county, but has not been developed.

The largest bat guano cave in Texas is in the northwest part of the county, about 25 miles from Burnet, and about 14 miles from the railroad at Lake Victor. There are probably from 1,500 to 2,000 tons of bat guano in this cave. Bat guano varies a good deal in its content of ammonia, but the best of it contains from 10 to 12 per cent, and it is worth from $20 to $24 a ton, delivered at fertilizer factories. A hopeful man, with a turn for figures, once attempted to count the bats coming from this cave, but abandoned the attempt on the plea that his arithmetic had "gin out." For a description of the bat guano caves in Texas, reference is made to an article, by the writer, in "Mines and Minerals," Scranton, Pa., May, 1901. Near this cave, and on Silver creek, there is a sandstone containing galena (sulphide of lead), which has been worked to a small extent. Samples of this deposit gave 10 per cent of lead. Another outcrop of galena, in limestone, is found between Fairland and Marble Falls, a short distance east of the wagon road. A sample of this ore gave 12.5 per cent of lead. The lead ore in Burnet county carries but little silver and no gold.

A sandstone of good quality has been developed near Sandstone Spur, A. & N. W. Ry., at the Woods' quarry. The composition of the gray rock from this quarry is as follows:

	Per cent.
Silica	65.60
Alumina	8.85
Oxide of iron	3.90
Lime	6.00
Magnesia	0.80
Soda	1.50
Potash	6.00
Carbonic acid	5.98
	98.63
Weight of a cubic foot, pounds	154.75
Pounds of water absorbed per cu. ft.	9.4
Crushed at pounds per sq. inch	4,450

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A ledge of gray sandstone that occurs at Hoover's Point, A. & N. W. Ry., about a mile from the Colorado river bridge, has the following composition:

	Per cent.
Silica	65.28
Alumina	7.12
Oxide of iron	4.50
Lime	8.51
Magnesia	1.28
Carbonic acid	12.10
Sulphuric acid	0.21
	99.00

This stone crushed at 15,775 pounds per square inch. It weighed 153 lbs. per cubic foot and absorbed 3.74 lbs. of water per cu. ft.

CALDWELL COUNTY.

Location: Southeast of center.

County seat—Lockhart; population, 2,945; elev. 518; lat. 29° 54′; long. 97° 40′; mag. dec. 8° 50′ (1912).

Area, square miles, 530.

Population, 24,237.

Railroads, 3.

Miles of railroad, 55.49.

Assessed valuation of property of all kinds, $11,981,144.

Mineral resources—Clays; iron ore; lignite; gravel.

The clays have not been investitgated. Lignite occurs near Prairie Lea and at Burdett Wells. A sample from this latter place had the following composition:

	Per cent.
Moisture	8.15
Volatile combustible matter	29.06
Fixed carbon	39.73
Ash	23.08
Sulphur	1.33

On the West Fork there occurs a siliceous limestone of the following composition:

	Per cent.
Silica	52.80
Alumina	5.87
Oxide of iron	1.53
Lime	18.19
Magnesia	0.64
Carbonic acid	12.10
Loss on ignition	5.00
	96.13

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CALLAHAN COUNTY.

Location—Northwest of center.

County seat—Baird; population, 1,710; elev. 1,708.

Area, square miles, 882.

Population, 12,973.

Railroads, 2.

Miles of railroad, 39.84.

Assessed valuation of property of all kinds, $6,073,539.

Mineral resources—Limestone; sandstone; mineral waters; gravel.

From 1 to 2 miles west of Baird there is a limestone of the following average composition:

	Per cent.
Silica	1.77
Alumina	0.85
Oxide of iron	1.45
Lime	50.77
Magnesia	None
Carbonic acid	39.38
Loss on ignition	3.63
	97.85

Two miles west of Baird there is a sandstone of the following composition:

	Per cent.
Silica	88.00
Alumina	4.42
Oxide of iron	1.22
Lime	0.80
Magnesia	0.72
Carbonic acid	0.80
Sulphuric acid	1.65
Loss on ignition	1.90
	99.51

CALHOUN COUNTY.

Location—Southeast Texas; borders on the Gulf of Mexico.

County seat—Port Lavaca; population, 1,699; elev. 22; lat. 28° 37′; long. 96° 37′; mag. dec. 8° 10′.

Area, square miles, 592.

Population, 3,635.

Railroads, 2.

Miles of railroad, 55.

Assessed valuation of property of all kinds, $4,783,881.

Mineral resources—Clays; salt; gravel.

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The clays have not been investigated. There are no known salt deposits and such salt as may be obtained is derived from sea water.

CAMERON COUNTY.

Location—Extreme southern part; borders on the Gulf of Mexico and the Rio Grande.

County seat—Brownsville; population, 10,517; elev. 33.

Area, square miles, 671.

Population, 27,158 (inclusive of the portion now in Willacy county).

Railroads, 3.

Miles of railroad, 146.30.

Assessed valuation of property of all kinds, $15,923,148.

Mineral resources—Clays; salt; gravel.

The mineral resources of this county have not been investigated.

CAMP COUNTY.

Location—Northeast Texas.

County seat—Pittsburg; population, 1,916; elev. 392; lat. 33° 0′; long. 94° 57′; mag. dec. 8° 7′ (1911).

Area, square miles, 217.

Population, 9,551.

Railroads, 2.

Miles of railroad, 28.80.

Assessed valuation of property of all kinds, $3,283,045.

Mineral resources—Clays; iron ore; lignite; gravel.

The mineral resources of this county have not been investigated, although it is known that good clays occur and also some deposits of lignite and iron ore.

CARSON COUNTY.

Location—About the center of the Panhandle.

County seat—Panhandle; population, 521; elev. 3,451; lat. 35° 21′; long. 101° 23′; mag. dec. 11° 1′.

Area, square miles, 860.

Population, 2,127.

Railroads, 3.

Miles of railroad, 66.04.

Assessed valuation of property of all kinds, $3,858,933.

Mineral resources—Unknown.

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CASS COUNTY.

Location—Northeast Texas.

County seat—Linden; population, 675; elev. 270; lat. 32° 59′; long. 94° 22′; mag. dec. 7° 46′ (1912).

Area, square miles, 945.

Population, 27,587.

Railroads, 7.

Miles of railroad, 107.87.

Assessed valuation of property of all kinds, $6,783,135.

Mineral resources—Clays; iron ore; lignite; sandstone; gravel.

The clays have not been investigated. Some years ago an attempt was made to develop the lignite, but there are no mines in the county now. In the northeastern part of the county lignite occurs at Alamo and Stone Coal Bluff. At this latter place it was said to be 12 feet thick and to have the following composition:

	Per cent.
Moisture	15.80
Volatile combustible matter	39.42
Fixed carbon	39.78
Ash	5.00
	100.00

In respect of iron ore, however, the situation is most encouraging. During the last two or three years a great deal of prospecting and development work has been done and extensive deposits of good brown ore have been examined in such detail that the engineers were able to estimate probable tonnage. One company reports 30,000,000 tons, another a like amount, so that the question of available tonnage may now be regarded as settled within a reasonable degree of accuracy.

The ore is limonite (hydrated sesquioxide of iron), and occurs as a blanket formation near the tops of the hills and ridges. The over-burden is light, seldom reaching 6 feet, and consists of soil, sandy clays, etc., which are easily removed, either by plow and scraper or by the steam shovel. The thickness of the ore-bearing stratum varies from 2 to 5 feet. At some localities there is a considerable admixture of siderite (carbonate of iron) with the limonite.

Shipments of ore that had not been washed or calcined gave 57 per cent of iron. Just how much of this grade of ore is pres-

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ent remains to be seen, but it is probable that a large tonnage of ore that will carry 50 per cent of iron, without washing or calcining, can be depended on.

If the entire "bank" of ore is mined, it will be necessary, for economical reasons, to treat it by one or another of the usual washing and jigging processes or by means of the Goltra process, which dispenses with the use of water. Plans for the erection of a washing and jigging plant of a capacity of 1,000 tons a day have been made, but the matter has not proceeded farther at this writing.

Preliminary estimates of the cost of mining and loading a ton of 50 per cent ore vary from 75 cents to 90 cents. The all-rail freight rate to tidewater, 300 miles, is $1, so that it is possible to lay this ore down at Galveston Bay for $1.75 to $1.90 a ton.

The Gulf, Colorado & Santa Fe Railway has built at Port Bolivar an iron ore loading dock for handling from 3,000 to 4,000 tons of ore a day, the only one on the Atlantic or Gulf Coast south of Baltimore.

The iron ore area of Cass County appears to cover 350 square miles.

CASTRO COUNTY.

Location—Northwest Texas; south of the Panhandle.

County seat—Dimmit; population, 140; elev. —; lat. 34° 33′; long. 102° 19′; mag. dec. 12° 33′.

Area, square miles, 870.

Population, 1,850.

Railroads, 1.

Miles of railroad, 2.48.

Assessed valuation of property of all kinds, $3,289,433.

Mineral resources—Unknown.

CHAMBERS COUNTY.

Location—Southeast Texas; borders on the Gulf of Mexico.

County seat—Anahuac; population, 300; elev. 23.

Area, square miles, 648.

Population, 4,234.

Railroads, 1.

Miles of railroad, 18.06.

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Assessed valuation of property of all kinds, $3,206,115.

Mineral resources—Clays; salt, from evaporation of sea water.

Near Cedar Bayou there is a sandy brick clay of the following composition:

	Per cent
Silica	85.60
Alumina	6.71
Oxide of iron	1.44
Lime	Trace
Magnesia	0.43
Soda	0.65
Potash	0.50
Titanic acid	1.00
Water	3.10
	99.43
Total fluxes	3.02

This clay does not burn steel hard at a temperature of 2,390 deg. F.

This clay is worked in yards around Cedar Bayou.

CHEROKEE COUNTY.

Location—East Texas; east of the Neches river.

County seat—Rusk; population, 1,558; elev. 489.

Area, square miles, 990.

Population, 29,038.

Railroads, 4.

Miles of railroad, 154.31.

Assessed valuation of property of all kinds, $11,891,855.

Mineral resources—Clays; iron ore; lignite; sandstone; gravel.

The brick manufactured are represented by a sample, several years old, from the Rusk Brick Company. The results of the examination were as follows:

Weight per cubic foot, pounds	111.9
Per cent. of cells by volume	29.09
Volume of cells in 100 parts by weight	16.24
Pounds of water absorbed, per cu. ft.	18.17
Crushed, at pounds per square inch	1,498

The buff-burning semi-refractory clays for common and pressed brick are represented by the following analysis of a sample taken at Rusk:

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	Per cent.
Silica	82.45
Alumina	10.92
Oxide of iron	1.08
Lime	0.22
Magnesia	0.96
Soda	None
Potash	None
Titanic acid	1.00
Water	2.47
	99.10
Total fluxes	2.26

At a temperature of 2,890 deg. F. this clay showed a tendency to blister.

The sandy brick clays of this county are represented by an analysis of a sample taken at Rusk. The composition was as follows:

	Per cent.
Silica	72.76
Alumina	14.46
Oxide of iron	3.81
Lime	0.08
Magnesia	1.93
Soda	Trace
Potash	Trace
Titanic acid	1.43
Water	4.61
	99.08
Total fluxes	.5.82

This clay becomes viscous at a temperature of 2,570 deg. F.

There is a good deal of lignite in Cherokee county, especially around Alto, but the seams are somewhat thin and no mining operations are conducted now. The following analysis gives the average composition of the better quality of lignite.

	Per cent.
Moisture	7.57
Volatile combustible matter	48.62
Fixed carbon	37.52
Ash	6.29
Sulphur	2.13

The iron ores of Cherokee county have been utilized for more than 50 years in the manufacture of iron, but no pig iron has been produced in the county since 1909, when the State furnace at Rusk was closed down. With respect to the iron ore situation it can be said that excellent ores are to be found in many parts

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of the county, especially on Gent Mountain, north of the railroad between Palestine and Rusk. So far as can now be ascertained, the ores used in the State furnace at Rusk contained from 43 to 45 per cent of iron.

What has been said with respect to the iron ores of Cass county applies also to the iron ores of Cherokee county, with the exception that no such close estimate of tonnage has been made in this county as was made in Cass county.

The total iron ore area in this county is probably not less than 350 to 400 square miles.

The old Alcalde (State) furnace at Rusk was built in 1883, and put in blast February 27, 1884. It was a charcoal furnace, 55x10 1-6 feet. It was rebuilt in 1896 and had an annual capacity of 10,000 tons of pig iron. It was changed to coke in 1903-04, capacity 23,000 tons, and discontinued in 1909. There was a cast-iron pipe foundry connected with the furnace. For several years all of the operations, including the mining of the ore and charcoal burning, were conducted with convict labor. The Star and Crescent furnace, near Rusk, was built in 1890-91, and put in blast November 26, 1891. It was a charcoal furnace, 65x11 feet, and had an annual capacity of 18,000 tons of pig iron. The charcoal was made at the furnace in large beehive ovens. This furnace has not been in operation for some years.

The Tassie Belle furnace, New Birmingham, near Rusk, was built in 1889-90. It was also a charcoal furnace, 60x11 feet, and had an annual capacity of 13,500 tons of pig iron. It has been idle for a number of years.

These three furnaces and the one at Jefferson, Marion county, are the only iron furnaces in Texas. It has been several years since any of them was operated.

The combined annual capacity of the four furnaces was 72,500 tons of pig iron.

CHILDRESS COUNTY.

Location—Northwest Texas; southeast of the Panhandle.

County seat—Childress; population, 3,818; elev. 1,877; lat. 34° 26′; long. 100° 9′; mag. dec. 10° 45′.

Area, square miles, 660.

Population, 9,538.

Railroads, 1.

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Miles of railroad, 28.

Assessed valuation of property of all kinds, $5,275,765.

Mineral resources—Unknown.

CLAY COUNTY.

Location—North Texas; borders on the Red river.

County seat—Henrietta; population, 2,104; elev. 886; lat. 33° 49′; long. 98° 12′; mag. dec. 9° 19′.

Area, square miles, 1,250.

Population, 17,043.

Railroads, 5.

Miles of railroad, 95.35.

Assessed valuation of property of all kinds, $14,483,375.

Mineral resources—Asphalt rock; clays; natural gas; petroleum; gravel.

The asphalt rocks have not been investigated, but it is likely that they are bituminous sandstones of the same character as are found around St. Jo and Muenster, Montague county.

The clays of this county have not been investigated.

The petroleum and natural gas areas are in the northeast part of the county around Petrolia. Down to the close of the year 1913 the total value of the crude petroleum produced in what is known as the Henrietta-Petrolia field was $996,741, representing 1,312,612 barrels of 42 gallons each.

The natural gas from Petrolia is piped to many north Texas cities and towns. Up to the 1st of November, 1913, the pipe line mileage of the Lone Star Gas Company from Clay county was 366, not inclusive of gathering lines. The total value of the natural gas produced in the year 1913 was $2,073,823, the greater part of which is to be credited to Clay county. The total quantity of gas produced from wells in Texas in 1913 was 12,159,755,000 cubic feet, of an average price of 17.05 cents per thousand cubic feet. The greater part of this gas was from Clay county.

The natural gas from Clay county has a heating value of 700 British thermal units per cu. ft., due, almost entirely, to its content of marsh gas (methane). At the close of the year 1913 there were 33 gas wells in Clay County operated by four companies, viz: Lone Star Gas Company, Wichita Falls Gas

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Company, Henrietta Oil and Gas Company, and Developers' Oil and Gas Company.

The geology of the oil and gas fields of Clay county have been investigated by J. A. Udden, geologist for the Bureau of Economic Geology. His report was issued in 1912 as Bulletin No. 246, "The Oil and Gas Fields of Wichita and Clay Counties," and may be obtained on application to the Bureau.

COCHRAN COUNTY (Unorganized).

Location—Northwest Texas; in Staked Plains; borders on New Mexico.

Area, square miles, 957.

Population, 65.

Railroads, none.

Assessed valuation of property of all kinds, $527,936.

Mineral resources—Unknown.

COKE COUNTY.

Location—Northwest of center.

County seat—Robert Lee; population, 582; elev. —; lat. 31° 54′; long. 100° 29′; mag. dec. 10° 7′.

Area, square miles, 850.

Population, 6,412.

Railroads, 1.

Miles of railroad, 32.56.

Assessed valuation of property of all kinds, $3,215,825.

Mineral resources—Asphalt rock; clays; gypsum; limestone; gravel.

The mineral resources have not been investigated.

COLEMAN COUNTY.

Location—Northwest of center.

County seat—Coleman; population, 3,046; elev. 1,690; lat. 31° 50′; long. 99° 25′; mag. dec. 9° 30′.

Area, square miles, 1,302.

Population, 22,618.

Railroads, 1.

Miles of railroad, 63.83.

Assessed valuation of property of all kinds, $13,119,970.

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Mineral resources—Clays; coal; glass sand; limestone; natural gas; petroleum; sandstone; gravel.

The clays have not been investigated.

The coal has been mined to a small extent, but there are no operations in the county at the present time. Analyses of the coal from near Rockwood, and from the old Silver Moon mine, northeast of Santa Anna, are as follows:

	Rockwood.	Silver Moon.
Moisture	3.07	2.36
Volatile combustible matter	33.05	38.55
Fixed carbon	39.10	43.88
Ash	24.78	15.21
	100.00	100.00
Sulphur	3.10	5.91

The best analysis of the coal from near Rockwood gives, ash 9.79 and sulphur 2.22.

We have examined two samples of limestone from Coleman county, near Santa Anna, with the following results:

	Gray.	Light red.
Silica	0.74	4.00
Alumina	0.72	1.36
Oxide of iron	0.58	1.30
Lime	54.77	50.15
Carbonic acid	41.60	39.40
Loss on ignition	2.40	3.10
....	100.81	99.31
Weight per cubic foot, pounds	143.8	167.9
Pounds of water absorbed per cu. ft.	8.84	0.36
Crushed at, pounds per sq. inch	3,125	5,750

An extensive deposit of excellent glass sand occurs at Santa Anna. This material contains about 98.5 per cent of silica.

In the southeastern part of the county near Trickham both petroleum and natural gas have been found in commercial quantities, and it is thought that this field is of a promising character. The gas is now piped to Santa Anna.

The quality of the sand-lime brick made of material from Coleman county is represented by tests on a sample received from J. W. Parker & Sons, Santa Anna, as follows:

Weight of a cubic foot, lbs	108.5
Per cent. of cells by volume	33.29
Volume of cells in 100 parts by weight	19.16
Pounds of water absorbed per cu. ft.	20.78
Crushed at, pounds per square inch	1,418

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COLLIN COUNTY.

Location—North Texas.

County seat—McKinney; population, 4,714; elev. 592; lat. 33° 13′; long. 96° 36′; mag. dec. 8° 44′.

Area, square miles, 828.

Population, 49,021.

Railroads, 6.

Miles of railroad, 160.01.

Assessed valuation of property of all kinds, $27,829,119.

Mineral resources—Clays; limestone; gravel.

The mineral resources have not been investigated.

COLLINGSWORTH COUNTY.

Location—Southeast corner of the Panhandle.

County seat—Wellington; population, 576; elev. 1,980; lat. 34° 51′; long. 100° 12′; mag. dec. 11° 6′.

Area, square miles, 900.

Population, 5,224.

Railroads, 1.

Miles of railroad, 15.52.

Assessed valuation of property of all kinds, $3,898,642.

Mineral resources—Unknown.

COLORADO COUNTY.

Location—Southeast Texas; traversed by the Colorado river.

County seat—Columbus; population, 1,824; elev. 201; lat. 29° 41′; long. 96° 32′; mag. dec. 8° 58′ (1912).

Area, square miles, 948.

Population, 18,897.

Railroads, 5.

Miles of railroad, 114.40.

Assessed valuation of property of all kinds, $13,579,737.

Mineral resources—Clays; gravel.

For bleaching refined cotton seed oil a sample of fuller's earth from near Weimar gave J. C. Blake (A. and M. College) a power of 53 as compared with English earth at 100.

The mineral resources have not been fully investigated.

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COMAL COUNTY.

Location—South of center.

County seat—New Braunfels; population, 3,165; elev. 637.

Area, square miles, 569.

Population, 8,434.

Railroads, 2.

Miles of railroad, 49.51.

Assessed valuation of property of all kinds, $6,945,198.

Mineral resources—Bat guano; limestone; marble; gravel.

The Dittlinger Lime Company, New Braunfels, has been engaged for several years in the development of the limestones of Comal county. It has a large plant on the I. & G. N. Ry. a few miles south of New Braunfels. The following analyses represent the limestones from this locality:

	1	2
Silica	0.21	0.16
Alumina	0.16	0.33
Oxide of iron	trace	0.43
Lime	55.35	50.50
Magnesia	0.03	0.07
Carbonic acid	43.17	39.68
Loss on ignition	1.25	7.52
	100.05	98.69
Weight per cubic foot, pounds	155.42	163.7
Pounds of water absorbed per cu. ft.	5.33	1.01
Crushed at, pounds per sq. inch	12,077	5,000

The composition of the white lime made by the Dittlinger Lime Company is as follows, average of three analyses:

	Per cent.
Silica	0.33
Alumina	0.22
Oxide of iron	0.41
Lime	93.83
Carbonic acid	0.80
Loss on ignition	3.50
	99.09

COMANCHE COUNTY.

Location—North of center.

County seat—Comanche; population, 2,756; elev. 1,358; lat. 31° 53′; long. 98° 36′; mag. dec. 9° 20′.

Area, square miles, 828.

Population, 27,186.

Railroads, 3.

Miles of railroad, 91.86.

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Assessed valuation of property of all kinds, $11,789,449.

Mineral resources—Clays; coal; limestone; glass sand; gravel.

The mineral resources of this county have not been investigated. The glass-sand has been used in the glass works at Wichita Falls.

The sand-lime brick made in Comanche county are represented by the tests made on a sample from the Comanche Brick Company, Comanche, as follows:

Weight of a cubic foot, pounds	104.88
Per cent of cells by volume	38.20
Volume of cells in 100 parts by weight	22.70
Pounds of water absorbed per cu. ft.	23.80
Crushing strength, pounds per sq. in	2,618

CONCHO COUNTY.

Location—West of center.

County seat — Paint Rock; population, 800; elev. 1,640; lat. 31° 30′; long. 99° 55′; mag. dec. 9° 58′.

Area, square miles, 941.

Population, 6,654.

Railroads, 3.

Miles of railroad, 33.22.

Assessed valuation of property of all kinds, $4,471,897.

Mineral resources—Clays; pulverulent silica; gravel.

The mineral resources have not been investigated.

COOKE COUNTY.

Location—North Texas; borders on the Red river.

County seat—Gainesville; population, 7,624; elev. 730; lat. 33° 37′; long. 97° 9′; mag, dec. 9° 18′.

Area, square miles, 1,000.

Population, 26,603.

Railroads, 3.

Miles of railroad, 59.62.

Assessed valuation of property of all kinds, $16,471,897.

Mineral resources—Asphalt rock; clays; limestone; sandstone; petroleum; gravel.

The clays, limestones and sandstones of Cooke county have not been investigated. There are no producing oil wells in the

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county, but it is thought that portions of the county lie well within the oil-bearing formations of this part of the State.

The asphalt rocks occur in the western and southwestern part. They are bituminous sandstones of the following composition:

	From Per cent.	To Per cent.
Asphaltene	trace	0.82
Petrolene	5.31	14.17
Carbonate of lime	trace	0.56
Silica	87.36	93.68
Sulphur	0.14	2.38
Total bitumen	5.76	14.99

The bricks manufactured are represented by a sample received from the Gainesville Pressed Brick Company, as follows:

Weight of a cubic foot, pounds	115.40
Per cent of cells by volume	27.11
Volume of cells in 100 parts by weight	14.66
Pounds of water absorbed per cu. ft	16.91
Crushed at, pounds per sq. inch	2,784

CORYELL COUNTY.

Location—Near center.

County seat—Gatesville; population, 1,929; elev. 774; lat. 31° 27′; long. 97° 45′; mag. dec. 8° 51′.

Area, square miles, 1,115.

Population, 21,703.

Railroads, 2.

Miles of railroad, 45.95.

Assessed valuation of property of all kinds, $9.545.730.

Mineral resources—Clays; limestone; gravel.

The clays have not been investigated.

The composition of the limestones which were used as a flux in the blast furnace at Rusk, Cherokee county, was as follows:

Silica	0.10
Oxide of iron	0.28
Carbonate of lime	99.60

Four samples of stone received from D. R. Boone, Lone Star Lime Works, Oglesby, had the following composition:

	1	2	3	4
Silica	0.30	0.40	0.30	0.04
Alumina	0.16	0.51	0.47	0.01

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	1	2	3	4
Oxide of iron	0.12	0.43	0.29	0.29
Lime	55.39	51.66	52.12	52.62
Magnesia	0.11	0.32	0.54	0.48
Carbonic acid	42.61	42.40	40.95	41.50
Sulphuric acid	n. d.	0.17	0.17	0.20
Loss on ignition	n. d.	2.18	4.05	4.00
	98.69	98.07	98.89	99.14
Weight of cu. ft., lbs.	154.80	150.60	124.60	144.70
Pounds of water absorbed per cu. ft.	6.51	4.59	13.75	5.51
Crushed at, lbs. per square inch.	3,811	3,778	444	2,356

COTTLE COUNTY.

Location—Northwest Texas; south of the Panhandle.

County seat—Paducah; population, 1,350; elev. 1,886; lat. 34° 2′; long. 100° 16′; mag. dec. 10° 22′.

Area, square miles, 956.

Population, 4,396.

Railroads, 1.

Miles of railroad, 27.39.

Assessed valuation of property of all kinds, $4,581,538.

Mineral resources—Unknown, with exception of copper ore and gypsum.

CRANE COUNTY (Unorganized).

Location—West Texas, east of the Pecos river.

County seat—

Area, square miles, 850.

Population, 331.

Railroads, 1.

Miles of railroad, 1.67.

Assessed valuation of property of all kinds, $754,535.

Mineral resources—Salt; sulphate of soda.

CROCKETT COUNTY.

Location—West Texas, east of the Pecos river.

County seat—Ozona; population, 427; elev. 2,500; lat. 30° 43′; long. 101° 13′; mag. dec. 9° 46′.

Area, square miles, 3,004.

Population, 1,296.

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Railroads, 1.
Miles of railroad, 3.00.
Assessed valuation of property of all kinds, $2,742,442.
Mineral resources—Unknown, with exception of limestone.

CROSBY COUNTY.

Location—West Texas, east side of the Staked Plains.
County seat—Crosbyton; population, 120; elev. 3,058.
Area, square miles, 984.
Population, 1,765.
Railroads, 2.
Miles of railroad, 20.43.
Assessed valuation of property of all kinds, $3,530,920.
Mineral resources—Unknown.

CULBERSON COUNTY.

Location—Trans-Pecos Texas; south of New Mexico.
County seat—Van Horn; population, 175; elev. 4,010.
Area, square miles, 3,780.
Population,
Railroads, 2.
Miles of railroad, 67.10.
Assessed valuation of property of all kinds, $4,617,206.
Mineral resources—Copper-silver ores; lead ores; limestone; marble; natural gas; petroleum; sandstone; sulphur; tungsten ores; turquois; zinc ores.

Copper-silver ores are found in the Sierra Diablo, north of Van Horn. The Hazel mine is the best known property in this district, and has yielded excellent ores. Some prospecting for ores of lead and tungsten has been carried on near the Marble Canyon, thirty miles north of Van Horn. The marble at Marble Canyon has not been developed. The same may be said as to natural gas and petroleum, which, from geological considerations, should be found in this county. At one time there was considerable activity in the zinc fields northeast of Boracho, but no producing mines were opened. Turquois occurs near Van Horn, and this locality has yielded some handsome stones.

The sulphur deposits of Culberson county occur in the eastern and central portions and are from ten to fifteen miles west of

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the Pecos River Railroad. In this district native sulphur is found in a gypseous limestone and workable deposits often begin practically at the surface. Some years ago a plant for the extraction of sulphur was operated in this district, and it is reported that two carloads of pure sulphur were obtained and sent to St. Louis, but the plant was soon closed down. The sulphur deposits occur in Blocks 60, 61, 62, in Township 2, and in Blocks 108, 110, 111, 113, and 114 in Township 3. They are underlaid by gypsum and gypseous limestones which, in turn, are above oil and sulphur-bearing shales resting on sandstones.

In Section 13, Block 113, Township 3, near Maverick Spring, a pit 41 feet deep gave the following:

	Feet.	Inches
Earth	1	..
Gypseous sand	1	..
White gypsum	3	..
Gypsum, with 4 per cent. sulphur	1	6
Hard gypseous shale and gravel with 31 per cent. sulphur	4	6
Material carrying 44 per cent. sulphur	1	..
Light brown gypseous material, with 30 per cent. sulphur	4	..
Soft white material with 12.7 per cent sulphur	6	..
Black gravel and gypsum with 26.3 per cent. sulphur.	8	..
Blue ore with 46 per cent. sulphur, streaky	11	..
	41 ft.	

The pit left off in the so-called "blue ore." From 6½ feet below the surface to 41 feet there were 34½ feet of material carrying from 12.7 per cent to 46 per cent of sulphur. Of this 34½ feet, there were 28½ feet that carried from 26 to 46 per cent.

The total thickness of the sulphur-bearing formation is not known.

No serious attempts to develop this sulphur district have been made during the last fifteen years, although the situation is such as to merit a much closer examination than has yet been made. There are several localities where excellent sulphur sets in at the surface, and many of the old pits now show good material from the surface to a depth of 10 to 15 feet. The overburden generally is light, and there would be no serious difficulty in handling this and the sulphur ore by means of a steam (or gasoline) shovel.

There is no solid fuel in the district, and good drinking water

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is not plentiful. But a crude oil that could be used in a Diesel engine is found at shallow depths a few miles from the sulphur area.

DALLAM COUNTY.

Location—Extreme northwest corner of Panhandle.

County seat—Dalhart; population, 2,580; elev. 3,985; lat. 36° 4′; long. 102° 31′; mag. dec. 12° 2′.

Area, square miles, 1,463.

Population, 4,001.

Railroads, 2.

Miles of railroad, 63.47.

Asessed valuation of property of all kinds, $6,763,300.

Mineral resources—Unknown.

DALLAS COUNTY.

Location—North Texas.

County seat — Dallas; population (1913-14), 111,986; elev. 425; lat. 32° 45′; long. 96° 45′; mag. dec. 8° 44′ (1911).

Area, square miles, 900.

Population, 135,748.

Railroads, 10.

Miles of railroad, 301.29 (not including electric lines).

Assessed valuation of property of all kinds, $129,550,350.

Mineral resources—Clays; gravel; limestone; cement materials. The clays, limestones and shales are used in the manufacture of Portland cement on a large scale in two establishments near Dallas, viz.: the Trinity Portland Cement Company and the Texas Portland Cement Company.

The red and brown burning clays are represented by the average of four analyses of samples from west Dallas, as follows:

	Per cent.
Silica	55.20
Alumina	22.90
Oxide of iron	4.62
Lime	1.95
Magnesia	1.41
Soda	0.61
Potash	0.67
Titanic acid	1.33
Water	6.24
Carbonic acid	1.88

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	Per cent.
Organic matter	2.79
Sulphuric acid	0.90
	100.50

These clays became steel hard at temperatures ranging from 1,922 to 2,102 degrees F.

The composition of the shale which is used near Dallas for making Portland cement is represented in the following analysis:

	Per cent.
Silica	57.26
Alumina	18.45
Oxide of iron	8.25
Lime	1.52
Magnesia	None
Carbonic acid	1.20
Sulphuric acid	None
Loss on ignition	13.00
	99.68

DAWSON COUNTY.

Location—West Texas, south of Staked Plains.

County seat—Lamesa; population, 500; elev. 3,200.

Area, square miles, 900.

Population, 2,320.

Railroads, 1.

Miles of railroad, 17.83.

Assessed valuation of property of all kinds, $2,838,026.

Mineral resources—Unknown.

DEAF SMITH COUNTY.

Location—Southwest part of Panhandle; borders on New Mexico.

County seat—Hereford; population, 1,750; elev. 3,806; lat. 34° 49′; long. 102° 24′; mag. dec. 11° 42′.

Area, square miles, 1,477.

Population, 3,942.

Railroads, 1.

Miles of railroad, 24.38.

Assessed valuation of property of all kinds, $5,992,272.

Mineral resources—Unknown.

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DELTA COUNTY.

Location—Northeast Texas.

County seat — Cooper; population, 1,513; elev. 495; lat. 33° 21′; long. 95° 41′; mag. dec. 8° 17′.

Area, square miles, 266.

Population, 14,566.

Railroads, 3.

Miles of railroad, 30.19.

Assessed valuation of property of all kinds, $5,833,480.

Mineral resources—Clays.

The red and brown burning clays are represented by the following analysis of a sample from Cooper:

	Per cent.
Silica	53.48
Alumina	14.76
Oxide of iron	6.24
Lime	8.08
Magnesia	1.44
Soda	1.60
Potash	0.85
Titanic acid	1.00
Water	6.90
Carbonic acid	4.66
	99.01
Total fluxes	18..21

This clay became viscous at a temperature of 2,174 degrees F. and was steel hard at 2,102 degrees F.

DENTON COUNTY.

Location—North Texas.

County seat — Denton; population, 4,732; elev. 620; lat. 33° 12′; long. 97° 8′; mag, dec. 9° 18′ (1911).

Area, square miles, 865.

Population, 31,258.

Railroads, 4.

Miles of railroad, 99.14.

Assessed valuation of property of all kinds, $19,398,170.

Mineral resources—Clays; iron gravel for road-making; mineral waters; limestone.

The pottery clays are represented by two anlyses of samples from near Denton and Lloyd, as follows:

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	Near Denton.	Near Lloyd.
Silica	69.56	70.00
Alumina	15.69	18.70
Oxide of iron	2.37	1.20
Lime	2.38	0.50
Magnesia	2.00	1.20
Soda	0.87	1.50
Potash	0.77	Trace
Titanic acid	1.20	1.00
Water	5.00	6.10
	99.84	100.20
Total fluxes	8.29	3.40

These clays burn steel hard at a temperature of 1,994 degrees F. and vitrify at 2498 degrees F.

The buff-burning semi-refractory clays are represented by three analyses of samples taken at Denton, as follows:

	Top layer.	Middle layer.	Bottom layer.
Silica	57.00	51.50	56.20
Alumina	25.59	17.60	23.70
Oxide of iron	3.44	16.60	1.50
Lime	0.96	1.00	0.60
Magnesia	0.72	1.10	1.50
Soda	0.82	Trace	2.20
Potash	0.94	1.50	1.40
Titanic acid	1.87	1.60	1.60
Water	10.00	7.70	11.10
	100.34	98.60	99.80
Total fluxes	6.98	20.20	7.20

The clay from the top layer showed signs of becoming viscous at a temperature of 2,498 deg. F. The clay from the middle layer became steel hard at 2,246 degress F., and the clay from the bottom layer vitrified at 2,498 degrees F.

The quality of the brick made is shown by the results of testing two samples, several years old, from the Denton Brick & Tile Company, as follows:

	1	2
Weight of a cubic foot, pounds	121.40	107.30
Per cent. of cells by volume	25.50	29.66
Volume of cells in 100 parts by weight	13.16	17.26
Pounds of water absorbed per cu. foot	15.97	18.51
Crushed at, pounds per sq. in.	2,518	1,792

The brick made at Denton by the Acme Pressed Brick Company of Fort Worth are represented as follows:

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	Weight. per cu. ft. lbs.	Per cent. of cells by Vol.	Volume of cells in 100 parts by weight.	Pounds of water absorbed per cu. ft.	Crushed at pounds per sq. in.
1	149.50	5.39	2.25	3.36	6,644
2	150.70	3.67	1.52	2.29	5,926
3	128.90	4.41	1.98	2.55	7,596
4	151.60	3.40	1.40	2.12	7,242
5	130.80	9.86	4.71	6.16	7,442
6	122.60	16.25	8.27	10.13	5,850
7	120.40	21.30	11.04	13.29	4,282

Explanation:

1. Smooth vitrified.
2. Aztec A.
3. Aztec B.
4. Aztec B A.
5. Denton, light Flemish, grade 1.
6. Denton, dark bronze, grade 1.
7. Denton, dark fire flashed, grade 1.

Composition of water from Brock's mineral well, Denton, Texas:

	Grains per U. S. Gal.
Calcium sulphate	130.31
Calcium carbonate	37.50
Calcium chloride	13.86
Magnesium sulphate	45.00
Magnesium carbonate	16.80
Magnesium chloride	11.86
Sodium sulphate	24.85
Sodium carbonate	5.09
Sodium chloride	449.54
Oxide of iron	Trace
Alumina	Trace
Organic and volatile matter	57.02
Silica	2.09
	793.72

Analysis by P. S. Tilson, Houston.

DE WITT COUNTY.

Location—Southeast Texas: traversed by Guadalupe river.

County seat—Cuero; population, 3,109; elev. 177; lat. 29° 6′; long. 97° 17′; mag. dec. 8° 24′.

Area, square miles, 880.

Population, 23,501.

Railroads, 2.

Miles of railroad, 72.61.

Assessed valuation of property of all kinds, $18,563,040.

Mineral resources—Clays; gravel.

The mineral resources have not been investigated.

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DICKENS COUNTY.

Location—West Texas; south of the Panhandle.

County seat — Dickens population, 375; elev. 2,200; lat. 33° 37′; long. 100° 50′; mag. dec. 10° 14′.

Area, square miles, 918.

Population, 3,092.

Railroads, 1.

Miles of railroad, 11.53.

Assessed valuation of property of all kinds, $3,973,744.

Mineral resources—Unknown. Heavy salt brines containing chloride of potash are found at Spur. The deepest boring in the State, 4,489 feet, is at Spur.

DIMMIT COUNTY.

Location—South Texas.

County seat—Carrizo Springs; population, 350; elev. 600; lat. 28° 30′; long. 99° 51′; mag. dec. 9° 53′.

Area, square miles, 1,164.

Population, 3,460.

Railroads, 2.

Miles of railroad, 58.38.

Assessed valuation of property of all kinds, $6,453,344.

Mineral resources—Clays; coal; gravel.

The clays and coal have not been developed.

DONLEY COUNTY.

Location—Southeast part of Panhandle.

County seat—Clarendon; population, 1,946; elev. 2,727; lat. 34° 57′; long. 100° 53′; mag. dec. 10° 36′.

Area, square miles, 878.

Population, 5,284.

Railroads, 2.

Miles of railroad, 49.37.

Assessed valuation of property of all kinds, $5,688,943.

Mineral resources—Unknown.

DUVAL COUNTY.

Location—South Texas.

County seat—San Diego; population, 1,897; elev. 312; lat. 27° 45′; long. 98° 14′; mag. dec. 8° 36′.

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Area, square miles, 950.

Population, 8,964. (This includes portions cut off for Jim Hogg and Dunn).

Railroads, 1.

Miles of railroad, 60.36.

Assessed valuation of property of all kinds, $4,908,626. (Includes 888 square miles now in Dunn County).

Mineral resources—Petroleum; sandstone; limestone.

There are no producing oil wells in Duval county, but around Benavides certain wells that were bored showed both oil and gas.

One sample of limestone from the Gault quarry has been tested with the following results:

Weight per cubic foot, pounds	149.09
Pounds of water absorbed per cu. ft.	0.04
Crushed at pounds per sq. inch	6,303

The composition of the sandstone quarried at Noleda, is as follows:

	Per cent.
Silica	92.14
Alumina	1.07
Oxide of iron	2.89
Lime	1.52
Carbonic acid	1.20
Loss on ignition	1.42
	100.24

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CHAPTER III.

DISCUSSION OF COUNTIES—Continued.

Eastland-Lee.

EASTLAND COUNTY.

Location—North of center.

County seat—Eastland; population, 855; elev. 1,421.

Area, square miles, 947.

Population, 23,421.

Railroads, 2.

Miles of railroad, 82.85.

Assessed valuation of property of all kinds, $9,816,415.

Mineral resources—Clays; coal; sandstone; mineral water; gravel; natural gas.

The buff-burning semi-refractory clays are represented by an analysis of a sample from Cisco, as follows:

	Per cent.
Silica	62.26
Alumina	23.78
Oxide of iron	3.02
Lime	Trace
Magnesia	0.10
Soda	1.59
Potash	1.16
Titanic acid	1.40
Water	7.12
	100.43
Total fluxes	5.87

This clay became steel hard at a temperature of 1,992 degrees F. and showed signs of fusion at 2,498 degrees F. The composition of the upper shale, at Cisco is closely similar to the above.

The coal is represented by an analysis of a sample from the old Smith-Lee mines, Cisco, as follows:

	Per cent.
Moisture	13.44
Volatile combustible matter	34.86
Fixed carbon	36.37
Ash	15.33
	100.00
Sulphur	2.54
British thermal units per pound	9,609

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The composition of water from Mangum Mineral Well Water Company:

	Grains per U. S. Gal. Well No. 1.	Well No. 2.
Sodium chloride	86.92	118.40
Magnesium chloride	25.76	34.76
Magnesium sulphate	95.71	74.25
Calcium sulphate	2.67	31.15
Calcium bicarbonate	65.38	65.63
Oxide of iron and alumina	0.41	2.91
Silica	1.39	1.86
	278.24	328.96

Analysis by D. L. Glasscock, University of Texas.

ECTOR COUNTY.

Location—West Texas, southeast of New Mexico.

County seat — Odessa; population, 400; elev. 2,890; lat. 31° 52′; long. 102° 23′; mag. dec. 10° 54′.

Area, square miles, 976.

Population, 1,178.

Railroads, 1.

Miles of railroad, 31.50.

Assessed valuation of property of all kinds, $3,268,005.

Mineral resources—Unknown.

EDWARDS COUNTY.

Location—Southwest Texas.

County seat—Rock Springs; population, 389; elev. 2,400; lat. 30° 1′; long. 100° 12′; mag. dec. 9° 40′.

Area, square miles, 1,387.

Population, 3,768 (includes portion taken from Real County).

Railroads, none (K. C., M. & O. projected).

Assessed valuation of property of all kinds, $4,518,458 (includes 471 sq. mi. now in Real County).

Mineral resources—Limestone; gravel; petroleum.

The kaolin deposits which occur near Leakey are described under Real county, as this new county embraces this locality.

A sample of limestone from Barksdale, used in the construction of the public school building there, had the following composition and qualities:

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	Per cent.
Silica	0.70
Oxide of iron and alumina	0.70
Lime	53.12
Magnesia	0.54
Carbonic acid	43.30
Organic matter	0.50
	98.86

Crushing strain in lbs. per square inch...5,293

Lubricating oil of good quality has been found by drilling in the western and northwestern parts of the county, but no producing wells have been brought in.

ELLIS COUNTY.

Location—Northeast of center.

County seat—Waxahachie; population, 6,205; elev. 530; lat. 32° 25′; long. 96° 52′; mag. dec. 8° 25′.

Area, square miles, 1,066.

Population, 5,629.

Railroads, 6.

Miles of railroad, 160.06.

Assessed valuation of property of all kinds, $35,980,190.

Mineral resources—Clays; limestone; gravel.

The composition of the red and brown-burning clays, for common and pressed brick, is represented by the following average analysis of two samples from Ferris:

	Per cent.
Silica	48.76
Alumina	15.23
Oxide of iron	4.60
Lime	11.18
Magnesia	1.61
Soda	1.13
Potash	1.29
Titanic acid	0.96
Water	4.93
Carbonic acid	8.22
Sulphuric acid	1.28
Organic matter	0.67
	99.86

These clays became steel hard at about 2,150 deg. F.

The brick manufactured in Ellis county are represented by the following analyses:

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	1	2	3	4	5	6	7	8
Weight per cu. ft., lbs.	111.00	105.10	105.89	103.37	108.50	117.10	98.81	105.8
Per cent of cells by volume	33.56	36.06	36.06	37.96	35.11	24.96	42.29	54.79
Volume of cells in 100 parts by weight	18.89	21.46	21.28	22.92	20.20	13.31	26.72	32.81
Pounds of water absorbed per cu. ft.	20.98	22.55	22.52	23.69	21.91	15.58	26.40	34.13
Crushed at pounds per square inch	4,049	2,350	2,875	3,131	3,121	3,288	1,813	1,975

1. **Diamond Press Brick Works, Ferris.**
2. **Ferris Press Brick Company, Ferris. "Ferris."**
3. **Globe Pressed Brick Company, Ferris. Common kiln run.**
4. **Lone Star Press Brick Company, Ferris. "Red Star," common building brick.**
5. **Palmer Pressed Brick Works, Palmer.**
6. **Standard Brick Company, Palmer. Top, or light burned.**
7. **Standard Brick Company, Palmer. Arch, or hard burned.**
8. **Texas Press Brick Company, Ferris.**

EL PASO COUNTY.

Location—Extreme western part.

County seat—El Paso; population, 39,279; elev. 3,711; lat. 31° 45′; long. 106° 30′; mag. dec. 12° 3′.

Area, square miles, 5,573.

Population, 52,599.

Railroads, 6.

Miles of railroad, 258.24.

Assessed valuation of property of all kinds, $45,693,385.

Mineral resources—Clays; copper ores; granite; lead ores; limestone; marble; sandstone; silver ores; tin ores; zinc ores; mineral waters; dolomite; materials for cement making; gravel; syenite; syenite-porphyry.

The mineral resources are of a diversified character, but development has been retarded. The cement-making materials are utilized by the Southwestern Portland Cement Company on a considerable scale near El Paso. The tin ore in the Franklin Mountains has been partly developed, but operations have been suspended. The copper, lead, zinc and silver ores of the Quitman Mountains are certainly worthy of close investigation. The lead-zinc ores on the eastern side of the Quitman Mountains have been partly developed and of late operations for lead have been successfully conducted. The copper-lead-silver ores on the western side of this range have also been partly developed. Shipments of copper ore carrying 18 per cent of copper have been made from the north end of the range.

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Shipments of silver-lead ore have also been made from the western side. The proximity of this district to the El Paso smelter, from 80 to 90 miles, and the short distance from rail, 4 to 6 miles, are much in its favor. The granite of the Franklin Mountains is used locally. The blue limestone (Carboniferous?) at the base of the Quitman Mountains, east side, has the following composition:

	Per cent.
Silica	0.30
Alumina	0.09
Oxide of iron	0.61
Lime	52.27
Magnesia	0.25
Carbonic acid	40.80
Sulphuric acid	0.89
Loss on ignition	2.48
	97.69

Two samples of limestone received from A. Courschesne, El Paso, had the following composition and qualities:

	Per cent.	
	No. 3.	No. 4.
Silica	4.20	2.10
Alumina	.....	.....
Oxide of iron	2.16	0.40
Lime	52.00	53.17
Magnesia	Trace	1.11
Carbonic acid	40.86	42.20
Loss on ignition	.....	1.70
	99.32	99.68
Weight of a cubic foot, lbs.	169.04	165.36
Pounds of water absorbed per cubic foot	0.101	None
Crushing strength, pounds per square inch	22,400	8,564

Three samples of dolomite received from A. Courschesne, El Paso, had the following composition and qualities:

	Per cent.		
	1	2	3
Silica	1.86	1.44	0.70
Alumina	.....	.....	.....
Oxide of iron	1.70	0.42	1.20
Lime	28.89	28.99	29.56
Magnesia	20.18	20.21	20.76
Carbonic acid	44.30	45.20	44.54
Loss on ignition	2.50	2.10	3.20
	99.43	98.35	99.96

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Weight per cubic foot, pounds	177.21	177.84	177.21
Pounds of water absorbed per cu. ft.	None	None	None
Crushing strength, lbs. per sq. inch	18,920	5,966	11,675

The mica deposits near Dahlberg have been opened and worked to some extent, affording a good quality of mica.

A gray granite received from A. Courschesne had the following qualities:

Weight for cubic foot, pounds	162.06
Pounds of water absorbed per cu. ft.	0.65
Crushing strength, pounds per sq. inch	23,000

The composition of the limestone used in making cement in El Paso county is as follows:

	Per cent.
Silica	22.76
Alumina	4.70
Oxide of iron	3.40
Lime	36.40
Magnesia	None
Carbonic acid	28.60
Sulphuric acid	None
Loss on ignition	4.70
	100.56

The composition of the water from the Hot Wells is as follows, analysis by Willis W Waite:

	Grains per U. S. Gal.
Calcium bicarbonate	1.74
Magnesium bicarbonate	0.96
Silica	1.10
Sodium chloride	2.97
Sodium nitrate	0.43
Sodium bicarbonate	16.62
Sodium sulphate	11.02
Iron	None
Alumina	None
	34.84

The depth of these wells is 1000 feet and the temperature of the water is 110 deg. F.

The clays of the county have not been fully investigated, but are used by the International Brick Company on an extensive scale.

The value of the pig tin produced from the tin ore in the Franklin Mountains is about $5,000.

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ERATH COUNTY.

Location—north of center.

County seat—Stephenville; population, 2,561; elev. 1,283; lat. 32° 13′; long. 98° 12′; mag. dec. 8° 57′.

Area, square miles, 1,110.

Population, 32,095.

Railroads, 4.

Miles of railroad, 96.74.

Assessed valuation of property of all kinds, $12,071,575.

Mineral resources—Clays; coal; limestone; natural gas; gravel.

A number of years ago the Green & Hunter Brick Company, Thurber, made a stiff mud repressed brick that crushed at 8,300 lbs. per sq. inch.

We have recently examined a sample of Vertical Fiber Paving Brick, made at Thurber, with the following results:

Weight per cubic foot, pounds	153.00
Pounds of water absorbed per cu. ft.	3.42
Crushed at, pounds per sq. in.	17,660
Cross bending test, modulus of rupture	3,174 lbs.

The coal industry which centers around Thurber (Texas & Pacific Coal Company) is considerably larger than in any other county. More than half of the bituminous coal produced in the State comes from this county.

The average of 8 analyses of Thurber coal is as follows:

	Per cent.
Moisture	3.30
Volatile combustible matter	34.11
Fixed carbon	49.88
Ash	12.71
	100.00
Sulphur	1.81
(5) British thermal units per pound	11,871

By far the greater part of the coal mined in this county is taken by the railroads for use under locomotive boilers, only a small part going into domestic use.

An excellent quality of natural gas is obtained in Erath county, carrying 932 B. t. p. per cubic foot. It is used locally.

The composition of the red and brown-burning clays is represented by an analysis of a sample from Thurber, as follows:

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	Per cent.
Silica	68.75
Alumina	15.81
Oxide of iron	4.05
Lime	0.60
Magnesia	1.64
Soda	0.08
Potash	Trace
Titanic acid	0.60
Water	4.07
Organic matter	2.10
	97.70
Total fluxes	6.37

This clay became viscous at a temperature of 2,174 deg. F.

A sample of limestone from Dublin had the following composition:

	Per cent.
Silica	6.60
Alumina	5.92
Oxide of iron	1.18
Lime	44.77
Magnesia	None
Carbonic acid	35.65
Sulphuric acid	None
Loss on ignition	5.67
	99.79

Weight per cubic foot, pounds	168.00
Pounds of water absorbed per cu. ft.	0.64

The composition of Southland mineral water, owned by the Duffau Mineral Wells Development Company, Duffau, is as follows:

	Per cent.
Magnesium chloride	92.90
Calcium sulphate	181.72
Calcium chloride	15.68
Sodium chloride	208.91
Calcium carbonate	22.75
Sodium nitrate	0.35
Iron carbonate (ferrous)	0.01
	522.32

Analysis by G. S. Fraps, A. and M. College.

FALLS COUNTY.

Location—East of center.

County seat—Marlin; population, 3,878; elev. 383.

Area, square miles, 844.

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Population, 35,649.
Railroads, 4.
Miles of railroad, 96.79.
Assessed valuation of property of all kinds, $18,701,520.
Mineral resources—Clays; mineral water.

The composition of the pottery clay is represented by an analysis of a sample from near Denny, as follows:

	Per cent.
Silica	68.60
Alumina	20.47
Oxide of iron	0.72
Lime	Trace
Magnesia	0.40
Soda	0.25
Potash	1.33
Titanic acid	1.13
Water	6.26
	99.16
Total fluxes	2.70
Temperature of fusion	3,074 deg. F.

This clay has been used in making common stoneware by the Denny Pottery Company.

The composition of the water from the Marlin Hot Wells is as follows:

	Grains per U. S. Gal.
Calcium sulphate	3.95
Sodium chloride	112.39
Sulphate of potash	0.80
Sulphate of soda	312.32
Sulphate of iron	3.02
Sulphate of alumina	12.20
Sulphate of magnesia	16.15
Sulphate of lime	34.10
Bicarbonate of soda	11.66
Silica	1.88
	508.47
Free carbonic acid, per gallon	3.60 cu. in.
Depth of well	3,350 feet

Analysis by E. Everhart, University of Texas.

FANNIN COUNTY.

Location—North Texas; borders on Red river.

County seat—Bonham; population, 4,844; elev. 568; lat. 33° 35′; long. 96° 11′; mag. dec. 8° 42′ (1912).

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Area, square miles, 940.

Population, 44,801.

Railroads, 5.

Miles of railroad, 102.49.

Assessed valuation of property of all kinds, $22,646,893.

Mineral resources—Clays; limestone; gravel.

The quality of the sand-lime brick which were formerly made at Bonham is represented by a test made on a sample as follows:

Weight of a cubic foot, lbs.	109.90
Per cent. of cells by volume	32.18
Volume of cells in 100 parts by weight	18.27
Pounds of water absorbed per cubic foot	20.06
Crushed at, lbs. per square inch	1,919

FAYETTE COUNTY.

Location—Southeast Texas; traversed by the Colorado river.

County seat — LaGrange; population, 1,850; elev. 272; lat. 29° 52′; long. 96° 49′; mag. dec. 8° 14′.

Area, square miles, 992.

Population, 29,796.

Railroads, 3.

Miles of railroad, 106.31.

Assessed valuation of property of all kinds, $19,618,293.

Mineral resources—Clays; fuller's earth; lignite; limestone; phosphate rock (reported); sandstone.

Some of the clays have recently come into use by a pottery company in Ohio and shipments have been made.

A sample of so-called "Kaolin," but not a kaolin at all, from near Lytenburg, had the following composition:

	Per cent.
Silica	73.00
Alumina	15.79
Oxide of iron	0.63
Lime	1.29
Magnesia	1.53
Soda	0.16
Potash	0.10
Titanic acid	0.43
Water	5.76
	98.69
Total fluxes	3.71

This clay burned steel hard at a temperature of 2,390 deg. F.

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It is whitish in color, but stained with oxide of iron on the joints and fractures. It burns to a whitish color, but has small black specks through it. It is not a fire clay, for it fuses to a clear glass at a temperature of 3,000 deg. F.

The so-called "pumice dust" is a gritty, sandy whitish clay of closely similar composition to the above.

In 1908 Professor J. C. Blake of the A. and M. College investigated the bleaching qualities of some earths from Fayette county. Five samples were submitted by J. C. Melcher, O'Quinn. The results were as follows, all of the samples being from near O'Quinn. The figures given are based upon 100 for the English standard:

Owner.	Bleaching power.
J. C. Melcher, No. 1 M. B.	224
J. C. Melcher, No. 1 M.	207
J. C. Melcher, No. 2 L.	81
F. Kicner, No. 3 K.	81
J. Lance, No. 4 X.	81

These results were from refined cotton seed oil. Professor Blake said: "None of the bleached oils, after standing for two weeks, exposed to the air, showed any increased odour, rancidity, or reversion of color."

Dr. F. C. Thiele, chemist for the Cudahy Refining Company, Coffeyville, Kansas, reported on a sample of earth from H. S. Turnage, Muldoon, November 13, 1911, as follows: Specific gravity, 0.850; weight per cubic foot, 53.1 lbs. The earth was ground to a fineness of 40-60 mesh and 510 grams were used in treating 1,000 cubic centimeters of mineral oil of specific gravity 0.9014 and color No. 5. The amount of filtered oil obtained was 79 per cent, the earth absorbing 21 per cent. The filtered oil was bright and had specific gravity 0.8991, color No. 3.

The same earth was then washed with light gasoline, dried and burned. It was then ground to a fineness of 100 mesh and used again. The amount of filtered oil obtained was 80 per cent, the earth absorbing 20 per cent. The filtered oil was brilliant, had a specific gravity of 0.8917 and color No. 1½.

Dr. Thiele remarked (private communication):

"These results show that the tested earth is an excellent material for bleaching mineral oils, comparing in this respect with the best grades on the market. The reduction of a No. 5 color

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(N. P. A.) to a No. 1½ (N. P. A.) by two filtrations through the same body of earth is remarkable. . . . In comparison with fuller's earth from Quincy, Florida, it exceeds the latter in bleaching qualities, while it stands incineration to an equal degree; this latter point being important, as fuller's earths are used over as many as six times, in practice, in order to cheapen their initial cost."

There is a possibility of discovering phosphate rock in Fayette county. Several years ago we received a communication from a reliable prospector that he had found a piece of "float" phosphate in Buckner's creek, about 8 miles west of Muldoon, that carried on analysis 82 per cent of bone phosphate. He found also in a railroad cut 3½ miles south of Flatonia a phosphate rock that carried 72 per cent of bone phosphate.

Either one of these samples represents a high grade phosphate, especially the sample from Buckner's creek. Nothing further has been done in the effort to locate a workable bed of phosphate rock in Fayette county. The attention of a number of persons, directly and intimately concerned in the phosphate industry, has been called to this matter, but they were not disposed to expend the necessary means for further and protracted inquiry. The Bureau of Economic Geology has not had the means to pursue the matter, and it stands today as it did several years ago. Much field work would have to be done and a great many samples would have to be analyzed. The importance of the subject merits the expenditure of considerable time and money.

The lignite has not been developed. The average of five analyses of the lignite from this county is as follows:

	Per cent.
Moisture	25.70
Volatile combustible matter	33.31
Fixed carbon	24.62
Ash	16.37
	100.00
Sulphur	2.07

With 25 per cent of moisture in this lignite there would be 7,797 British thermal units per pound.

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At Chalk Bluff, on the Colorado river, about 12 miles above LaGrange, there is an exposure of 5 feet of lignite. At Manton's Bluff the thickness of the seam is 15 feet, but it is of varying quality. On O'Quinn creek the seams run to 8 feet in thickness and appear to be of good quality.

The quality of the limestone on Buckner's creek, from 3 to 4 miles west of LaGrange, is represented by the following samples received from J. C. Melcher, O'Quinn:

	1	2
Silica	8.50	28.70
Alumina	0.60	0.59
Oxide of iron	2.26	0.93
Lime	46.87	37.39
Magnesia	0.39	0.30
Carbonic acid	37.10	29.38
Sulphuric acid	0.54	0.41
Loss on ignition	2.96	3.02
	99.22	100.72
Weight per cubic foot, pounds	156	140
Pounds of water absorbed per cu. ft.	3.81	4.08
Crushed at, pounds per square in.	5,615	15,325

Near Lena there are exposures of a fine-grained sandstone which has a crushing strength of 7,090 to 14,075 pounds per square inch. This stone has been used to a considerable extent.

At Muldoon, A. B. Kerr & Sons have had a good sandstone quarry for some years. The average quality of this stone is shown by the following tests:

Weight per cubic foot, pounds	130.00
Pounds of water absorbed per cu. ft.	10.00
Crushed at, pounds per sq. inch	4,369

The absorption of water, in pounds per cubic foot, varied from 5.60 to 14.42. The crushing strength, in pounds per square inch, varied from 1,822 to 9,150, according to the quality of the material.

FISHER COUNTY.

Location—Northwest of center.

County seat—Roby; population, 712; elev. 1,800; lat. 32° 45′; long. 100° 22′; mag. dec. 10° 26′.

Area, square miles, 836.

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Population, 12,596.
Railroads, 4.
Miles of railroad, 69.38.
Assessed valuation of property of all kinds, $6,124,199.
Mineral resources—Unknown.

FLOYD COUNTY.

Location—West Texas; south of Panhandle.
County seat — Floydada; population, 664; elev. 3,137; lat. 33° 59′; long. 101° 15′; mag. dec. 10° 28′.
Area, square miles, 1,036.
Population, 4,638.
Railroads, 1.
Miles of railroad, 18.90.
Assessed valuation of property of all kinds, $6,544,336.
Mineral resources—Unknown.

FOARD COUNTY.

Location—North Texas.
County seat—Crowell; population, 1,341; elev. 1,463; lat. 34° 10′; long. 99° 42′; mag. dec. 10° 43′.
Area, square miles, 636.
Population, 5,726.
Railroads, 2.
Miles of railroad, 21.76.
Assessed valuation of property of all kinds, $4,254,831.
Mineral resources—Copper ores; gypsum.
The copper ores of Foard county are Permian and have not been developed.

FORT BEND COUNTY.

Location—Southeast Texas; traversed by the Brazos river.
County seat—Richmond; population, 1,371; elev. 104; lat. 29° 35′; long. 95° 45′; mag. dec. 8° 29′.
Area, square miles, 897.
Population, 18,168.
Railroads, 6.
Miles of railroad, 141.65.
Assessed valuation of property of all kinds, $14,903,443.
Mineral resources—Clays; gravel.

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The sandy brick clays are represented by an analysis of a sample from Fulshear (Wilson plantation), as follows:

	Per cent.
Silica	83.80
Alumina	9.23
Oxide of iron	2.30
Lime	Trace
Magnesia	Trace
Soda	0.54
Potash	0.56
Titanic acid	0.87
Water	3.10
	100.40
Total fluxes	3.40

It does not burn steel hard at a temperature of 2,390 deg. F., but at 1,922 deg. it burns hard enough to make a good brick.

At Rosenberg the Brazos Tile & Brick Company makes brick and hollow building tile, as also sand-lime brick. Samples of the brick were tested with the following results:

	No. 1. Common.	Sand-lime.
Weight per cubic foot	117.70	112.20
Per cent. of cells by volume	26.98	30.06
Volume of cells in 100 parts by weight	14.34	16.77
Pounds of water absorbed per cu. ft.	16.87	18.81
Crushed at, pounds per sq. inch	4,813	1,575

FRANKLIN COUNTY.

Location—Northeast Texas.

County seat—Mt. Vernon; population, 1,200; elev. 476; lat. 33° 12′; long. 95° 12′; mag. dec. 8° 8′ (1911).

Area, square miles, 325.

Population, 9,331.

Railroads, 3.

Miles of railroad, 14.87.

Assessed valuation of property of all kinds, $2,945,975.

Mineral resources—Clays.

The mineral resources of Franklin county have not been investigated.

FREESTONE COUNTY.

Location—East of center; borders on the Trinity river.

County seat—Fairfield; population, 629; elev. —; lat. 31° 43′; long. 96° 9′; mag. deg. 8° 26′ (1911).

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Area, square miles, 947.

Population, 20,557.

Railroads, 3.

Miles of railroad, 46.63.

Assessed valuation of property of all kinds, $7,859,305.

Mineral resources—Clays; lignite; limestone.

The clays have not been investigated.

In the southern part of the county, near Donie, there is a very good quality of lignite and one of the principal seams runs to 12 feet in thickness. The average quality of this lignite is given in the following analysis:

	Per cent.
Moisture	26.37
Volatile combustible matter	32.72
Fixed carbon	30.93
Ash	9.98
	100.00
Sulphur	1.34
British thermal units per pound	7,984

FRIO COUNTY.

Location—South Texas.

County seat—Pearsall; population, 1,799; elev. 646; lat. 28° 55′; long. 99° 9′; mag. dec. 8° 26′.

Area, square miles, 1,064.

Population, 8,895.

Railroads, 1.

Miles of railroad, 34.55.

Assessed valuation of property of all kinds, $7,132,208.

Mineral resources—Clays; lignite.

The mineral resources of this county have not been investigated.

GAINES COUNTY.

Location—West Texas; borders on New Mexico.

County seat—Seminole; population, 325.

Area, square miles, 1,590.

Population, 1,255.

Railroads, none.

Assessed valuation of property of all kinds, $2,803,880.

Mineral resources—Unknown, with exception of salt lakes.

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GALVESTON COUNTY.

Location—Southeast Texas; borders on the Gulf of Mexico.

County seat—Galveston; population, 36,981; elev. 6; lat. 29° 18′; long. 94° 47′; mag. dec. 7° 28′.

Area, square miles, 438.

Population, 44,479.

Railroads, 11.

Miles of railroad, 440.63.

Assessed valuation of property of all kinds, $41,320,509.

Mineral resources—Clays; shell for road making.

GARZA COUNTY.

Location—West Texas; south of Staked Plains.

County seat—Post City; population, 350; elev. 2,543.

Area, square miles, 821.

Population, 1,995.

Railroads, 1.

Miles of railroad, 40.91.

Assessed valuation of property of all kinds, $3,004,174.

Mineral resources—Unknown.

GILLESPIE COUNTY.

Location—Southwest of center.

County seat—Fredericksburg; population, 2,100; elev. 1,721; lat. 30° 15′; long. 98° 50′; mag. dec. 9° 9′.

Area, square miles, 1,140.

Population, 9,447.

Railroads, 1.

Miles of railroad, 12.

Assessed valuation of property of all kinds, $5,807,690.

Mineral resources—Bat guano; granite; limestone; marble; sandstone; serpentine; gravel.

Bat guano occurs in limestone caves.

The granites of this county are of excellent quality and are utilized by Nagel Bros., Fredericksburg. The stone placed on the market by this firm comes from Bear Mountain. It is of a fine red color, close grained and takes an excellent polish.

There is excellent white marble in this county, but it has not been developed. Gold has been found, but there are no produc-

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ing mines. Serpentine exists in considerable deposits and of great and varied beauty, but it has not been placed on the market.

Limestones and dolomites are abundant.

The following average of eight analyses represents the composition and quality of some of the limestones from this county:

	Per cent.
Silica	2.36
Alumina	0.64
Oxide of iron	0.91
Lime	51.03
Magnesia	0.91
Carbonic acid	40.82
Loss on ignition	2.65
	99.34

A magnesian limestone of odd and beautiful markings occurs near Willow City. It takes a fine polish and would doubtless find favor as an ornamental stone for interior work. Its composition and qualities are as follows:

	Per cent.
Silica	3.80
Alumina	7.59
Oxide of iron	2.67
Lime	30.20
Magnesia	8.93
Carbonic acid	40.73
Sulphuric acid	1.72
Loss on ignition	4.82
	100.51
Weight of a cubic foot, pounds	176.8
Pounds of water absorbed per cu. ft.	0.19
Crushed at, pounds per square inch	8,000

The dolomites are well developed in Gillespie county. The following average of 5 analyses represents the composition of some of the dolomites:

	Per cent.
Silica	4.68
Alumina	5.28
Oxide of iron	1.05
Lime	29.55
Magnesia	14.66
Carbonic acid	40.56
Loss on ignition	4.29
	100.07

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GLASSCOCK COUNTY.

Location—West Texas.

County seat—Garden City; population, 200; lat. 31° 52′; long. 101° 29′; mag. dec. 10° 44′.

Area, square miles, 952.

Population, 1,143.

Railroads, none.

Assessed valuation of property of all kinds, $1,926,038.

Mineral resources—Unknown.

GOLIAD COUNTY.

Location—Southeast Texas.

County seat—Goliad; population, 1,261; elev. 167.

Area, square miles, 817.

Population, 9,909.

Railroads, 1.

Miles of railroad, 30.24.

Assessed valuation of property of all kinds, $8,652,755.

Mineral resources—Clays; limestone; natural gas.

The mineral resources of this county have not been investigated.

GONZALES COUNTY.

Location—Southeast Texas.

County seat—Gonzales; population, 3,139; elev. 300; lat. 29° 30′; long. 97° 26′; mag. dec. 8° 21′.

Area, square miles, 1,079.

Population, 28,055.

Railroads, 2.

Miles of railroad, 85.70.

Assessed valuation of property of all kinds, $15,946,265.

Mineral resources—Clays; iron ore; lignite; natural gas; petroleum; sandstone.

The calcareous brick clays are represented by the average of two analyses of samples taken at the works of the Sunset Brick & Tile Company, Gonzales, as follows:

	Per cent.
Silica	39.12
Alumina	7.31
Oxide of iron	1.89

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	Per cent.
Lime	24.85
Magnesia	1.92
Soda	0.11
Potash	0.04
Titanic acid	0.45
Water	2.46
Carbonic acid	21.37
	99.52
Total fluxes	28.82

These clays become viscous at a temperature of 2,318 deg. F.

Another kind of clay occurs in Gonzales county, on the Harwood property. It has been termed a fire-clay, but is not a fire-clay. Its composition and qualities are as follows:

	Per cent.
Silica	73.16
Alumina	13.86
Oxide of iron	1.44
Lime	3.14
Magnesia	1.61
Soda	0.23
Potash	Trace
Titanic acid	0.70
Water	5.15
	99.20
Total fluxes	6.42

It began to become viscous at a temperature of 2,390 deg. F.

There also exist in this county extensive deposits of a fine-grained milk white clay, stained with oxide of iron. No special uses for this clay have been found, but it is reported that it is an excellent material for refining certain animal oils and greases. Its composition and qualities are shown in the following average of two analyses of samples from the Harwood property, 6 miles southeast of Gonzales:

	Per cent.
Silica	75.41
Alumina	12.49
Oxide of iron	0.72
Lime	1.82
Magnesia	1.80
Soda	0.56
Potash	0.29
Titanic acid	0.19
Water	5.93
	99.21
Total fluxes	5.20

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These clays fused to a clear glass at a temperature of 3,038 deg. F.

The brick manufactured are represented by the following tests on samples received from the Sunset Brick & Tile Company, Gonzales:

	Common No. 1	Face 510	Gonzales No. 3	Gonzales No. 1	Face 530
Weight per cu. ft., pounds	93.82	92.76	89.60	91.70	91.00
Per cent of cells by volume	46.21	47.05	48.39	47.57	47.58
Volume of cells in 100 parts by weight	30.75	31.67	33.70	32.37	32.57
Pounds of water absorbed per cubic foot	28.64	28.17	30.19	29.68	29.63
Crushing strength, pounds per square inch	1,425	2,318	2,192	2,000	3,602

The lignite has not been developed. Brown iron ore (limonite) exists as large boulders and as gravel in the hills south of Harwood. Analyses have shown it to carry 52 per cent of iron.

The petroleum and natural gas have not been developed. Gas from a well 9 miles west of Gonzales gave 862 B. t. u. per cubic foot. Near Ottine a well bored to a depth of about 3,400 feet showed a little oil and gas, but not sufficient for commercial purposes.

There are heavy outcrops of a close-grained iron-bearing sandstone near the tops of hills southeast of Ottine which would yield a good stone for ballasting railroad tracks.

GRAY COUNTY.

Location—Eastern part of Panhandle.

County seat—Lefors; population,—; elevation, 2900.

Area, square miles, 860.

Population, 3,405.

Railroads, 2.

Miles of railroad, 41.90.

Assessed valuation of property of all kinds, $3,564,083.

Mineral resources—Unknown.

GRAYSON COUNTY.

Location—North Texas; borders on the Red river.

County seat—Sherman; population, 12,412; elev. 720; lat. 33° 36′; long. 96° 36′; mag. dec. 8° 35′.

Area, square miles, 1,012.

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Population, 65,996.

Railroads, 10.

Miles of railroad, 250.85.

Assessed valuation of property of all kinds, $45,521,022.

Mineral resources—Clays; lignite; limestone; mineral waters; gravel.

The red and brown-burning clays are represented by an analysis of a sample from near Sherman, as follows:

	Per cent.
Silica	59.34
Alumina	15.71
Oxide of iron	5.76
Lime	3.00
Magnesia	2.00
Soda	1.44
Potash	0.56
Titanic acid	1.83
Water	7.02
Carbonic acid	1.07
Sulphuric acid	0.31
Organic matter	2.00
	100.13
Total fluxes	12.85

This clay became steel hard at a temperature of 2,102 deg. F. and viscous at 2,382 deg. F.

Composition of water from Tioga Sanitarium & Water Company, Tioga:

	Well No. 1	Well No. 3	Well No. 4	Well No. 5
		Grains per U. S. Gal.		
Sodium sulphate			130.86	15.43
Sodium bicarbonate	10.30			
Sodium chloride	80.02	76.85	67.75	206.23
Magnesium chloride	40.50			
Calcium chloride	54.50			
Calcium sulphate	43.84	95.68	103.97	88.32
Calcium carbonate	7.59	5.74		6.17
Magnesium sulphate		64.78	175.45	44.62
Silica	1.57	2.92	2.54	5.59
Alumina		2.90	2.54	1.82
	238.32	248.87	488.67	368.18

GREGG COUNTY.

Location—Northeast Texas.

County seat—Longview; population, 5,155; elev. 339; lat. 32° 29′; long. 94° 41′; mag. dec. 7° 27′.

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Area, square miles, 287.

Population, 14,140.

Railroads, 5.

Miles of railroad, 53.71.

Assessed valuation of property of all kinds, $4,723,655.

Mineral resources—Clays; iron ore; lignite; sandstone; mineral waters; gravel.

The sandy brick clays are represented by two analyses of samples from Longview, as follows:

	Per cent.	
	1	2
Silica	73.06	68.50
Alumina	9.88	18.41
Oxide of iron	6.92	3.02
Lime	1.50	0.70
Magnesia	0.25	1.05
Soda	0.12	0.91
Potash	trace	0.47
Titanic acid	1.00	1.31
Water	6.64	6.20
	99.37	100.57
Total fluxes	8.81	6.15

These clays became viscous at a temperature of 2,570 deg. F.

The quality of the brick that have been made in this county is shown by the results of a test on a sample from Longview, as follows:

Weight per cubic foot, pounds	109.8
Per cent. of cells by volume	32.22
Volume of cells in 100 parts by weight	18.31
Pounds of water absorbed per cu. ft.	20.10
Crushed at, pounds per square inch	1,223

So far as known, there are but few deposits of iron ore in Gregg county that are of commercial importance. Most of the deposits carry too little iron and too much sand to be worked. On the Isaac Skillern headright, in the northeastern part of the county and south of the Texas & Pacific Railway, a brown ore (limonite) occurs, carrying 10.10 per cent of silica and 52.79 per cent of iron. An ore of a 11.60 per cent silica and 46.88 per cent iron is found on the W. Robinson headright. The field to which these ores belong is thought to comprise about 14 square miles.

In 1899 there was built at Longview, by the Longview Kelly

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Plow Manufacturing Company, one 1-gross ton Tropenas Steel Converter.

The first steel was made in December, 1899. This was the first steel converter built in Texas and made the first steel produced in the State.

The steel plant was abandoned some years ago, but the manufacture of plows is still continued.

The iron ore area in this county may be taken at 22 square miles.

GRIMES COUNTY.

Location—Southeast Texas; east of the Navasota river.

County seat—Anderson; population, 572; elev. 368; lat. 30° 29′; long. 95° 59′; mag. dec. 7° 45′.

Area, square miles, 770.

Population, 21,205.

Railroads, 4.

Miles of railroad, 155.93.

Assessed valuation of property of all kinds, $12,825,088.

Mineral resources—Clays; lignite; sandstone; gravel.

Grimes county clays of easy fusibility are represented by an analysis of a sample from a locality 13 miles northeast of Navasota, as follows:

	Per cent.
Silica	68.56
Alumina	18.53
Oxide of iron	0.72
Lime	0.60
Magnesia	0.12
Soda	2.72
Potash	2.27
Titanic acid	0.43
Water	7.00
	100.95
Total fluxes	6.43

This clay began to become viscous at a temperature of 2,174 deg. F.

The deposit from which this sample was taken extends also into Brazos county.

Two other analyses of clays from this county may be given, as follows:

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	Piedmont Springs.	Courtney.
	Per cent.	
Silica	58.50	40.69
Alumina	18.39	12.68
Oxide of iron	3.21	3.90
Lime	2.34	18.12
Magnesia	1.61	0.92
Soda	4.93	1.14
Potash	2.70	
Loss on ignition	8.20	
Carbonic acid and water		21.45
	99.88	100.00

For the lignite in this county, see under Brazos county.

GUADALUPE COUNTY.

Location—South of center.

County seat—Seguin; population, 3,116; elev. 553; lat. 29° 34′; long. 97° 57′; mag. dec. 8° 52′ (1912).

Area, square miles, 717.

Population, 24,913.

Railroads, 1.

Miles of railroad, 36.61.

Assessed valuation of property of all kinds, $14,119,587.

Mineral resources—Clays; gravel.

The mineral resources have not been investigated.

The calcareous brick clays are represented by an analysis of a sample from Seguin, as follows:

	Per cent.
Silica	18.62
Alumina	3.23
Oxide of iron	1.26
Lime	41.30
Magnesia	0.42
Water	2.42
Carbonic acid	32.50
	99.75
Total fluxes	42.98

Temperature of fusion above 2,246 deg. F.

The quality of the brick made in this county is shown by the following tests of two samples from the Seguin Vitrified & Face Brick Company:

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	Seguin dry press.	Stiff mud.
Weight of a cubic foot, pounds.....	112.9	119.4
Per cent. of cells by volume.....	28.81	20.63
Volume of cells in 100 parts by weight....	15.93	10.79
Pounds of water absorbed per cu. ft.....	17.98	12.88
Crushed at, pounds per sq. inch.....	2,271	3,765

HALE COUNTY.

Location—Northwest Texas; south of the Panhandle.

County seat—Plainview; population, 2,829; elev. 3,325; lat. 34° 12′; long. 101° 45′; mag. dec. 10° 55′.

Area, square miles, 1,036.

Population, 7,566.

Railroads, 1.

Miles of railroad, 46.70.

Assessed valuation of property of all kinds, $8,547,561.

Mineral resources—Unknown.

HALL COUNTY.

Location—Northwest Texas; south of the Panhandle.

County seat — Memphis; population, 1,936; elev. 1,980; lat. 34° 44′; long. 100° 32′; mag. dec. 10° 6′.

Area, square miles, 868.

Population, 8,279.

Railroads, 1.

Miles of railroad, 17.29.

Assessed valuation of property of all kinds, $5,982,217.

Mineral resources—Unknown.

HAMILTON COUNTY.

Location—North of center.

County seat — Hamilton; population, 1,548; elev. 1,250; lat. 31° 41′; long. 98° 7′; mag. dec. 9° 14′ (1912).

Area, square miles, 858.

Population, 15,315.

Railroads, 2.

Miles of railroad, 49.77.

Assessed valuation of property of all kinds, $10,933,042.

Mineral resources—Clays; limestone; gravel.

The clays have not been investigated. The limestones are

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represented by an analysis of a sample from a mile east of Hico, on the Texas Central Railway, as follows:

	Per cent.
Silica	3.44
Alumina	0.43
Oxide of iron	1.09
Lime	53.33
Carbonic acid	41.90
	99.89

This stone had the following physical properties:

Weight per cubic foot, pounds	127.2
Pounds of water absorbed per cu. ft	1.05
Crushed at, pounds per square inch	5,200

HANSFORD COUNTY.

Location—North line of the Panhandle.

County seat—Hansford; population, 180; elev. —; lat. 36° 13′; long. 101° 16′; mag. dec. 11° 17′.

Area, square miles, 860.

Population, 935.

Railroads, none.

Assessed valuation of property of all kinds, $1,489,777.

Mineral resources—Unknown.

HARDEMAN COUNTY.

Location—Northwest Texas; southeast of Panhandle.

County seat—Quanah; population, 3,127; elev. 1,568; lat. 34° 17′; long. 99° 44′; mag. dec. 10° 12′.

Area, square miles, 532.

Population, 11,213.

Railroads, 4.

Miles of railroad, 71.98.

Assessed valuation of property of all kinds, $8,973,320.

Mineral resources—Copper ores; gypsum; petroleum(?)

The copper ore belongs to the Permian formation. Rich nodules of chalcocite and malachite, the latter as pseudomorph after wood are found, but there are no mining operations. An excellent quality of gypsum cement is made from the gypsite deposits at Acme. There are no producing oil wells in the county, but, in places, the geological conditions for the existence of oil are not unfavorable.

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HARDIN COUNTY.

Location—Southeast Texas; west of the Neches river.

County seat—Kountze; population, 342; elev. 85; lat. 30° 22′; long. 94° 18′; mag. dec. 7° 47′ (1912).

Area, square miles, 844.

Population, 12,947.

Railroads, 4.

Miles of railroad, 106.70.

Assessed valuation of property of all kinds, $10,514,721.

Mineral resources—Asphalt rock; clays; natural gas; petroleum.

Asphaltic materials have been found near Saratoga and Sour Lake, but they have not been utilized.

The clays have not been investigated.

Natural gas occurs with the petroleum and is used locally.

Hardin is one of the most important oil-producing counties in the State. The Saratoga and Sour Lake fields came into production in 1902. The statistics for the years 1902 and 1903 are combined, and show a small production. From 1902 to and including 1913 the Saratoga field yielded 15,000,097 barrels, valued at $8,942,291; and the Sour Lake field 23,020,152 barrels, valued at $13,254,496. The Batson field came into production in 1903, and yielded, to the close of 1913, 25,661,013 barrels, valued at $12,437,274. The total oil production of Hardin county, to the close of 1913, was 63,681,262 barrels, valued at $34,635,061. To the close of the year 1913, Hardin had yielded considerably more oil than any other county.

HARRIS COUNTY.

Location—Southeast Texas; borders on Galveston Bay.

County seat—Houston; population, 93,112 (1913-14); elev. 53; lat. 29° 47′; long. 95° 21′; mag. dec. 7° 53′.

Area, square miles, 1,761.

Population, 115,693.

Railroads, 13.

Miles of railroad, 394.38.

Assessed valuation of property of all kinds, $129,504,485.

Mineral resources—Clays; gravel; natural gas; petroleum.

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The red and brown-burning clay are represented by two analyses of samples from Houston, as follows:

	1	2
Silica	72.45	49.40
Alumina	11.72	17.90
Oxide of iron	3.38	4.50
Lime	3.66	9.50
Magnesia	1.34	1.88
Soda	0.19	Trace
Potash	Trace	None
Titanic acid	0.87	1.05
Water	3.44	4.58
Carbonic acid		9.55
	97.05	98.36
Total fluxes	8.57	15.88

These clays became viscous at a temperature of 2,246 deg. F.

The sandy brick clays are represented by the average of three analyses:

	Per cent.
Silica	83.41
Alumina	7.20
Oxide of iron	2.26
Lime	0.78
Magnesia	0.45
Soda	0.12
Potash	Trace
Titanic acid	0.66
Water	3.58
	98.46
Total fluxes	3.97

These clays became steel hard at about 2,300 deg. F.

The clay at Cedar Bayou is similar to the above.

The natural gas has not been developed commercially, although good rock pressure has been observed in a well near Houston. The gas in the Humble field is used locally.

Harris is a very important oil county. The Humble field came into production in 1905 and yielded, to the close of 1913, 37,370,510 barrels, valued at $18,864,112. The Goose Creek field came into production in 1912, and has yielded 293,539 barrels, valued at $234,102.

The total oil production of Harris county has been 37,664,049 barrels, valued at $19,098,214.

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HARRISON COUNTY.

Location—Northeast Texas; borders on Louisiana.

County seat—Marshall; population, 11,452; elev. 375; lat. 32° 32′; long. 94° 21′; mag. dec. 7° 44′ (1910).

Area, square miles, 873.

Population, 37,243.

Railroads, 5.

Miles of railroad, 111.14.

Assessed valuation of property of all kinds, $12,901,680.

Mineral resources—Clays; iron ore; lignite; sandstone; gravel.

The sandy brick clays are represented by an analysis of a sample from Marshall, as follows:

	Per cent.
Silica	83.90
Alumina	5.52
Oxide of iron	4.75
Lime	0.40
Magnesia	1.32
Soda	0.45
Potash	0.15
Titanic acid	1.57
Water	2.44
	100.50
Total fluxes	7.07

This clay does not burn steel hard at a temperature of 2,570 deg. F.

A clay classed as pottery clay occurs on the road between Marshall and Jefferson. Analysis as follows:

	Per cent.
Silica	68.90
Alumina	21.83
Oxide of iron	1.57
Alkalies	2.00
Water	5.60
	99.90
Total fluxes	3.57

Other analyses of clays from this county do not show essential variations from the average of the two above given.

The quality of the brick is shown by the tests on a sample from the Marshall Brick Company, as follows:

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Weight per cubic foot, pounds	127.0
Per cent of cells by volume	22.99
Volume of cells in 100 parts by weight	11.30
Pounds of water absorbed per cu. ft.	14.35
Crushed at, pounds per square inch	1,755

The iron ore resources appear to warrant further investigation. The laminated brown ores carry from 42.85 to 48.75 per cent of iron, with silica from 11.60 to 26.70 per cent, and alumina from 2.05 to 10.77 per cent.

The nodular concretionary ores appear to have the following average composition:

	Per cent.
Metallic iron	47.81
Silica	11.67
Alumina	9.26

The conglomerate ores seldom carry more than 44 per cent of iron. The iron ore area in the county may be taken at 245 square miles.

In many parts of the county are extensive deposits of an iron-gravel which, while not carrying enough iron to make them valuable as iron ores, would make an excellent road material.

There are no lignite mines in operation in the county. The quality of the lignite, which varies from 2 to 6 feet in thickness, is shown by the following average of five analyses:

	Per cent.
Moisture	8.41
Volatile combustible matter	38.41
Fixed carbon	28.65
Ash	24.53
	100.00
Sulphur	0.74

HARTLEY COUNTY.

Location—West line of the Panhandle; borders on New Mexico.

County seat — Channing; population, 300; elev. 3,817; lat. 35° 41′; long. 102° 17′; mag. dec. 11° 57′.

Area, square miles, 1,460.

Population, 1,298.

Railroads, 3.

Miles of railroad, 81.92.

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Assessed valuation of property of all kinds, $5,376,036.

Mineral resources—Unknown.

HASKELL COUNTY.

Location—Northwest Texas.

County seat—Haskell; population, 2,436; elev. 4,013; lat. 33° 10′; long. 99° 43′; mag. dec. 9° 56′.

Area, square miles, 843.

Population, 16,249.

Railroads, 3.

Miles of railroad, 74.93.

Assessed valuation of property of all kinds, $8,643,079.

Mineral Resources—Copper ores; gypsum.

Mineral resources—Copper ores; gypsum.

The copper ores are Permian. Many rich pockets of chalcocite have been found, but no mining operations are conducted.

HAYS COUNTY.

Location—South of center.

County seat—San Marcos; population, 4,071; elev. 581; lat. 29° 54′; long. 97° 56′; mag. dec. 8° 29′.

Area, square miles, 647.

Population, 15,518.

Railroads, 2.

Miles of railroad, 36.00.

Assessed valuation of property of all kinds, $10,269,670.

Mineral resources—Bat guano; clays; limestone; gravel.

Hays county is rich in gravel for road making. The average composition of some of the limestones of the county along the line of the International & Great Northern Railway and the Austin-San Antonio Post-Road is as follows:

	Per cent.
Silica	1.89
Alumina	1.04
Oxide of iron	1.45
Lime	52.48
Magnesia	None
Carbonic acid	40.19
Sulphuric acid	1.96
Loss on ignition	0.91
	99.82

The crushing strength, in pounds per sq. in. varies from 8,000 to 16,000.

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HEMPHILL COUNTY.

Location—East line of the Panhandle; borders on Oklahoma.

County seat—Canadian; population, 1,648; elev. 2,340; lat. 35° 55′; long. 100° 24′; mag. dec. 11° 6′.

Area, square miles, 860.

Population, 3,170.

Railroads, 1.

Miles of railroad, 31.83.

Assessed valuation of property of all kinds, $3,870,481.

Mineral resources—Unknown.

HENDERSON COUNTY.

Location—Northeast Texas; between the Trinity and the Neches rivers.

County seat—Athens; population, 2,261; elev. 492; lat. 32° 13′; long. 95° 51′; mag. dec. 8° 7′.

Area, square miles, 940.

Population, 20,131.

Railroads, 2.

Miles of railroad, 80.91.

Assessed valuation of property of all kinds, $7,912,145.

Mineral resources—Clays; iron ore; lignite; sandstone; gravel.

The pottery clays are represented by the average of two analyses of samples taken at Athens, as follows:

	Per cent.
Silica	71.11
Alumina	17.85
Oxide of iron	0.28
Lime	0.05
Magnesia	0.41
Soda	0.68
Potash	0.36
Titanic acid	1.45
Water	6.31
	98.50
Total fluxes	1.80

Point of fusion, 3,074 to 3,146 deg. F.

An analysis of a fire clay from Athens is as follows:

	Per cent.
Silica	68.55
Alumina	26.00

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	Per cent.
Magnesia	0.11
Water	6.00
	100.66
Total fluxes	0.11

A stoneware clay from Athens had the following composition:

	Per cent.
Silica	69.20
Alumina	21.03
Oxide of iron	1.37
Magnesia	0.94
Loss on ignition	5.16
	97.70
Total fluxes	2.31

The quality of the brick is shown by the results of tests on samples from the museum several years old, and marked "Malakoff Pressed Brick Company, Malakoff," as follows:

	1	2	3	4
Wight per cubic foot, pounds	128.5	127.2	126.7	123.9
Per cent of cells by volume	24.06	22.89	18.74	22.56
Volume of cells in 100 parts by weight	11.70	11.23	9.23	11.37
Pounds of water absorbed per cubic foot	15.03	14.28	11.69	14.08
Crushed at, pounds per square inch	3,184	2,216	4,387	4,151

1. Shade D. Golden Orange. Standard shape.
2. Shade A. Old Ivory. Standard shape.
3. Shade E. Russian Black. Standard shape.
4. Shade C. Mottled Face. Standard shape.

In the southeastern part of the county there is a considerable area of brown iron ore (limonite). The ore from this field appears to have the following average composition:

	Per cent.
Metallic iron	47.26
Silica	12.13
Alumina	8.86

Towards the central part of the county, around Brownsboro, there is an iron ore field of about two square miles in area, which has a somewhat better ore, as by the following analysis:

	Per cent.
Metaillic iron	51.52
Silica	10.06
Alumina	9.89

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None of these ores has been developed. The iron ore area in the county may be taken at 19 square miles.

HIDALGO COUNTY.

Location—Extreme southern part; borders on the Rio Grande.
County seat—Edinburg; population, 200; elev. 422.
Area, square miles, 1,583.
Population, 13,728.
Railroads, 1.
Miles of railroad, 71.97.
Assessed valuation of property of all kinds, $13,202,734.
Mineral resources—Clays; gravel.
The mineral resources of this county have not been investigated.

HILL COUNTY.

Location—Northeast of center.
County seat—Hillsboro; population, 6,115; elev. 621; lat. 32° 1′; long. 97° 8′; mag. dec. 9° 5′ (1910).
Area, square miles, 1,006.
Population, 46,760.
Railroads, 8.
Miles of railroad, 236.12.
Assessed valuation of property of all kinds, $30,593,260.
Mineral resources—Clays; limestone; mineral waters; gravel
The mineral resources of Hill county have not been investigated.

The composition of the mineral water from Hubbard, as communicated to us by the management of the Hot Wells Sanitarium, is as follows:

	Grains per U. S. Gal.
Sodium chloride	292.0
Sodium sulphate	195.0
Calcium sulphate	49.3
Iron sulphate	20.2
Potassium sulphate	10.0
Magnesium sulphate	6.8
Sodium carbonate	110.4
	683.7

This well is 3,300 feet deep; the temperature of the water is 137 deg. F., and the flow is 200,000 gallons per 24 hours.

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HOCKLEY COUNTY (Unorganized)

Location—Northwest Texas; in Staked Plains.

Area, square miles, 977.

Population, 137.

Railroads, 1.

Miles of railroad, 7.22.

Assessed valuation of property of all kinds, $1,129,904.

Mineral resources—Unknown.

HOOD COUNTY.

Location—North of the center.

County seat—Granbury; population, 1,336; elev. 698; lat. 32° 27′; long. 97° 46′; mag. dec. 8° 55′ (1910).

Area, square miles, 436.

Population, 10,008.

Railroads, 2.

Miles of railroad, 35.05.

Assessed valuation of property of all kinds, $4,038,337.

Mineral resources—Clays; limestone; gravel.

The mineral resources of Hood county have not been investigated.

HOPKINS COUNTY.

Location—Northeast Texas.

County seat—Sulphur Springs; population, 5,151; elev. 494; lat. 33° 9′; long. 95° 36′; mag. dec. 7° 51′.

Area, square miles, 666.

Population, 31,038.

Railroads, 2.

Miles of railroad, 69.96.

Assessed valuation of property of all kinds, $8,513,830.

Mineral resources—Clays; lignite; mineral waters; petroleum; natural gas; gravel.

The lignite mined is represented by analyses of samples from the Como Coal Company, the Como Lignite Company and the Lone Star Lignite Mining Company, all at or near Como. The average of these analyses is as follows:

	Per cent.
Moisture	32.67
Volatile combustible matter	36.47

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	Per cent.
Fixed carbon	23.85
Ash	7.01
	100.00
Sulphur	0.61
British thermal units per pound	6,740

The red and brown-burning clays are represented by an analysis of a sample from Sulphur Springs, as follows:

	Per cent.
Silica	69.36
Alumina	14.67
Oxide of iron	4.46
Lime	0.28
Magnesia	1.74
Soda	2.09
Potash	1.55
Titanic acid	1.13
Water	3.64
Organic matter	0.96
	99.88
Total fluxes	10.12

This clay became viscous at a temperature of 2,246 deg. F., and did not become steel hard at 2,102 deg. F.

Several years ago G. H. Wilson made, at Sulphur Springs, a whitish colored brick of the following qualities:

Weight per cubic foot, pounds	115.8
Per cent. of cells by volume	29.24
Volume of cells in 100 parts by weight	15.76
Pounds of water absorbed per cu. ft	18.24
Crushed at, pounds per sq. inch	2,750

HOUSTON COUNTY.

Location—East Texas; east of the Trinity river.

County seat — Crockett; population, 3,947; elev. 350; lat. 31° 19′; long. 95° 27′; mag. dec. 8° 0′ (1911).

Area, square miles, 1,192.

Population, 29,564.

Railroads, 3.

Miles of railroad, 53.

Assessed valuation of property of all kinds, $9,079,375.

Mineral resources—Clays; iron ore; lignite; sandstone; natural gas; gravel.

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The sandy brick clays are represented by an analysis of a sample from Hurricane Bayou, as follows:

	Per cent.
Silica	77.70
Alumina	10.37
Oxide of iron	9.33
Lime	1.70
Magnesia	Trace
Soda	0.54
Potash	0.24
	99.78
Total fluxes	11.81

The iron ores of this county, so far as known, are too siliceous to come into use as a source of iron.

The lignite mined in this county is represented by analyses of samples from the Houston County Coal Company, Lovelady, and the Houston County Coal and Manufacturing Company, Crockett. The average of these analyses is as follows:

	Per cent.
Moisture	30.87
Volatile combustible matter	36.26
Fixed carbon	22.61
Ash	10.26
	100.00
Sulphur	0.50
British thermal units, per lb	7,525

Natural gas from a locality 14 miles west of Crockett gave 913 B. t. u. per cubic foot.

HOWARD COUNTY.

Location—West Texas.

County seat—Big Springs; population, 4,102; elev. 2,397; lat. 32° 15′; long. 101° 28′; mag. dec. 10° 25′.

Area, square miles, 888.

Population, 8,881.

Railroads, 1.

Miles of railroad, 32.80.

Assessed valuation of property of all kinds, $4,842,805.

Mineral resources—Unknown.

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HUNT COUNTY.

Location—Northeast Texas.

County seat—Greenville; population, 8,850; elev. 552; lat. 33° 7′; long. 96° 5′; mag. dec. 8° 46′ (1912).

Area, square miles, 888.

Population, 48,116.

Railroads, 4.

Miles of railroad, 162.32.

Assessed valuation of property of all kinds, $25,429,256.

Mineral resources—Clays; gravel.

The red and brown-burning clays are represented by an analysis of a sample from Greenville, as follows:

	Per cent.
Silica	79.00
Alumina	11.38
Oxide of iron	2.44
Lime	0.50
Magnesia	0.20
Soda	0.65
Potash	0.35
Titanic acid	0.78
Water	3.80
	99.00
Total fluxes	4.14

This clay became steel hard at a temperature of 2,246 deg. F.

HUTCHINSON COUNTY.

Location—About the center of the Panhandle.

County seat—Plemons; population, 100; elev. 2,800; lat. 35° 48′; long. 101° 18′; mag. dec. 11° 24′.

Area, square miles, 850.

Population, 892.

Railroads, none.

Assessed valuation of property of all kinds, $1,313,980.

Mineral resources—Unknown.

IRION COUNTY.

Location—West Texas.

County seat—Sherwood; population, 339; elev. 2,145; lat. 31° 17′; long. 100° 48′; mag. dec. 9° 46′.

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Area, square miles, 800.
Population, 1,283.
Railroads, 1.
Miles of railroad, 41.73.
Assessed valuation of property of all kinds, $2,312,611.
Mineral resources—Unknown.

JACK COUNTY.

Location—North Texas.
County seat—Jacksboro; population, 1,480; elev. 1,074; lat. 33° 13′; long. 98° 9′; mag. dec. 9° 18′.
Area, square miles, 858.
Population, 1,480.
Railroads, 2.
Miles of railroad, 69.46.
Assessed valuation of property of all kinds, $7,058,130.
Mineral resources—Coal; limestone; clays; gravel; petroleum.

The coal resources of Jack county are well developed, but no mining operations are conducted there. The quality of the coal may be judged from analyses of samples from the Stewart Creek Coal Co., Jermyn, and from Lost Valley, as follows:

	Stewart Creek	Lost Valley
	Per cent.	
Moisture	10.24	10.28
Volatile combustible matter	34.28	25.49
Fixed carbon	35.02	55.10
Ash	20.46	9.13
	100.00	100.00
Sulphur	1.66	n. d.
British thermal units per lb.	9,434	n. d.

There are excellent limestones in Jack county suitable for building purposes, for road making, etc. The quality of the stone quarried by Risley Bros., Jacksboro, is shown by an average of a number of analyses and tests:

	Per cent.
Silica	2.08
Alumina	....
Oxide of iron	1.54
Lime	51.81
Magnesia	0.48
Carbonic acid	40.83
Loss on ignition	3.00
	99.74

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A gray limestone from Risley Bros. had a crushing strength of 8,377 lbs. per square inch and a blue-gray stone 7,247 lbs. The gray stone weighed 162.29 lbs. per cu. ft. and absorbed 4.43 lbs. of water per cu. ft. The blue-gray stone weighed 162.91 lbs. per cu. ft. and absorbed 2.68 lbs. of water per cu. ft.

Another sample from the quarry had a weight of 165.4 lbs. per cu. ft., absorbed 0.94 lbs. of water per cu. ft. and crushed at 4,613 lbs. per sq. in.

A sample of limestone from J. W. Fox, Stewarton, had the following composition:

	Per cent.
Silica	3.62
Alumina	....
Oxide of iron	3.46
Lime	51.40
Magnesia	None
Carbonic acid	40.10
	98.58

This stone weighed 165.54 lbs. per cu. ft., absorbed 0.96 lbs. of water per cu. ft., and crushed at 9,500 lbs. per sq. in.

A sample of limestone from this county was tested as road material by the United States Office of Public Roads, Washington, with the following results:

Weight per cubic foot, pounds	165
Pounds of water absorbed per cu. ft.	1.63

This stone had the following composition:

	Per cent.
Silica	0.40
Alumina	0.05
Oxide of iron	2.57
Lime	51.06
Magnesia	0.23
Carbonic acid	40.66
Loss on ignition	2.78
	97.75

There are asphaltic sandstones in Jack county, but they have not been investigated.

A number of shallow oil wells 12 miles north of Jacksboro afford a fine lubricating oil. A refinery is to be built.

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JACKSON COUNTY.

Location—Southeast Texas; borders on Lavaca Bay.

County seat—Edna; population, 1,144; elev. 72; lat. 28° 58′; long. 96° 40′; mag. dec. 8° 22′.

Area, square miles, 888.

Population, 6,471.

Railroads, 3.

Miles of railroad, 47.75.

Assessed valuation of property of all kinds, $9,773,120.

Mineral resources—Clays.

The mineral resources of this county have not been investigated.

JASPER COUNTY.

Location—Southeast Texas; east of the Neches river.

County seat—Jasper; population, 473; elev. —; lat. 30° 55′; long. 93° 59′; mag. dec. 7° 19′.

Area, square miles, 977.

Population, 14,000.

Railroads, 5.

Miles of railroad, 146.20.

Assessed valuation of property of all kinds, $10,852,720.

Mineral Resources—Asphalt rock; lignite; sandstone; gravel.

The asphaltic sandstone is found at the old tar well, 4½ miles northeast of Rockland. Its composition is as follows:

	Per cent.
Asphaltene	7.12
Petrolene	20.14
Silica	72.24
Sulphur	0.24
	100.74
Total bitumen	27.26

Another deposit of similar character is found at Boykin's Spring, 3½ miles northeast of the tar well.

There is said to be some lignite in this county, but it has not been investigated.

The sandstones are used for rip-rap, etc., on a considerable scale. They occur in the northern part of the county and are quarried by D. M. Picton & Co., Beaumont. The crushing strength of these stones varies from 2,000 to 7,000 lbs. per sq. in.

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JEFF DAVIS COUNTY.

Location—Trans-Pecos Texas.

County seat—Fort Davis; population, 1,061; elev. 4,927 (highest town in the State).

Area, square miles, 1,922.

Population, 1,678

Railroads, 2.

Miles of railroad, 30.51.

Assessed valuation of property of all kinds, $4,193,766.

Mineral resources—Agate; copper ores; limestone; granite; trap rock.

The mineral resources of this county have not been thoroughly investigated, but copper ores are reported.

JEFFERSON COUNTY.

Location—Extreme southeast; borders on the Gulf of Mexico.

County seat—Beaumont; population, 20,640; elev. 21; lat. 30° 5′; long. 94° 5′; mag. dec. 7° 24′.

Area, square miles, 1,109.

Population, 38,182.

Railroads, 6.

Miles of railroad, 139.53.

Assessed valuation of property of all kinds, $49,276,544.

Mineral resources—Clays; natural gas; petroleum; gravel.

The red and brown-burning clays are represented by an analysis of a sample from near Beaumont, as follows:

	Per cent.
Silica	77.97
Alumina	11.04
Oxide of iron	3.19
Lime	0.84
Magnesia	0.38
Soda	None
Potash	None
Titanic acid	1.23
Water	3.24
Sulphuric acid	0.51
	98.40
Total fluxes	4.41

This clay became steel hard at a temperature of 2,102 deg. F. The quality of the brick made is shown by the following tests

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on samples from the Gulf States Brick Co. and the Beaumont Brick Co., several years old:

	1	2	3	4	5	6	7	8
Weight per cu. ft., lbs.	107.8	111.5	115.2	105.5	106.6	101.8	110.8	104.5
Per ct. of cells by volume	33.90	31.13	27.20	28.71	32.47	31.75	31.42	30.59
Vol. of cells in 100 parts by weight	19.63	17.44	14.74	16.98	19.01	19.47	17.69	18.27
Pounds of water absorbed per cu. ft.	21.16	19.44	16.98	17.91	20.26	19.82	19.60	19.09
Crushed at, lbs. per square inch	2,104	3,617	3,990	5,984	2,525	5,390	3,546	3,801

1. Gulf States Brick Co., Style D. P. No. 2, Red face.
2. Gulf States Brick Co., Style D. P. No. 3, Red face.
3. Gulf States Brick Co., Style No. 1, stiff mud, red.
4. Gulf States Brick Co., Style No. 1, stiff mud, red.
5. Gulf States Brick Co., Style speckle face, "Diana."
6. Gulf States Brick Co., Style D. P. No. 1, brown face.
7. Gulf States Brick Co., Style D. P. No. 5, red face.
8. Beaumont Brick Company.

Jefferson is one of the important oil producing counties. The bringing in of the great Lucas gusher, on Spindle Top, in January, 1901, was the beginning of the development of the oil fields of the Gulf Coastal Plain. Since that time the county produced, to the close of 1913, 40,709,220 barrels of oil, valued at $15,043,553. The natural gas, found in association with the oil, is used locally.

JIM HOGG COUNTY.

Location—South Texas.
County seat—Hebbronville; population, 190; elev. 680.
Area, square miles, 1,099.
Population, —— (included in Brooks and Duval Counties).
Railroads, 1.
Miles of railroad, 16.
Assessed valuation of property of all kinds, $2,459,564.
Mineral resources—Clays.

The mineral resources of this county have not been investigated.

JIM WELLS COUNTY.

Location—South Texas.
County seat—Alice; population, 2,136; elev. 205.
Area, square miles, 868.
Population, 5,500 (estimated).
Railroads, 2.

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Miles of railroad, 81.69.

Assessed valuation of property of all kinds, $6,929,645.

Mineral resources—Clays.

The mineral resources of this county have not been investigated.

JOHNSON COUNTY.

Location—North of center.

County seat—Cleburne; population, 10,364; elev. 764; lat. 32° 20′; long. 97° 23′; mag. dec. 9° 11′ (1910).

Area, square miles, 744.

Population, 34,460.

Railroads, 7.

Miles of railroad, 144.61.

Assessed valuation of property of all kinds, $22,356,735.

Mineral resources—Clays.

The mineral resources of this county have not been investigated.

JONES COUNTY.

Location—Northwest of center.

County seat—Anson; population, 1,842; elev. 1,716; lat. 32° 45′; long. 99° 54′; mag. dec. 10° 25′.

Area, square miles, 900.

Population, 24,299.

Railroads, 6.

Miles of railroad, 105.42.

Assessed valuation of property of all kinds, $12,191,525.

Mineral resources—Clays; limestone; copper ores.

The quality of the brick made is shown by the following tests on a sample from the Pioneer Brick Works, Stamford:

Weight per cubic foot, pounds	120.4
Per cent of cells by volume	27.23
Volume of cells in 100 parts by weight	14.12
Pounds of water absorbed per cu. ft.	17.00
Crushed at, pounds per sq. inch	1,770

The limestone industry centers around Lueders, where A. C. Fox has operated a quarry for some years. The quality of the stone obtained here is shown by the following average of a number of analyses and tests:

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	Per cent.
Silica	2.33
Alumina	1.19
Oxide of iron	1.39
Lime	52.02
Magnesia	Trace
Carbonic acid	40.59
Loss on ignition	3.00
	100.52

The weight per cubic foot varies from 141.3 to 164.1 pounds, with an average of 154.2. The pounds of water absorbed per cubic foot varies from 1.60 to 7.87, with an average of 4.71. The crushing strength, in pounds per square inch, varies from 2,487 to 7,822, with an average of 4,258.

The copper ores of this county are Permian and have not been developed.

KARNES COUNTY.

Location—Southeast Texas.

County seat—Karnes City; population, 635; elev. 404; lat. 28° 55′; long. 97° 54′; mag. dec. 8° 35′.

Area, square miles, 740.

Population, 14,942.

Railroads, 1.

Miles of railroad, 44.02.

Assessed valuation of property of all kinds, $10,658,244.

Mineral resources—Clays; lignite.

The mineral resources of this county have not been investigated

KAUFMAN COUNTY.

Location—Northeast Texas.

County seat—Kaufman; population, 1,959; elev. 439; lat. 32° 35′; long. 96° 20′; mag. dec. 8° 12′.

Area, square miles, 932.

Population, 35,323.

Railroads, 3.

Miles of railroad, 97.58.

Assessed valuation of property of all kinds, $19,188,184.

Mineral resources—Clays; mineral waters; limestone; natural gas.

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The mineral resources have not been thoroughly investigated. A sample of siliceous limestone from near Chief was examined in the laboratory of the Office of Public Roads, Washington, with the following results:

Weight per cubic foot, pounds	162
Pounds of water absorbed per cu. ft.	1.63

Its chemical composition was as follows, analysis by J. E. Stullken, Bureau of Economic Geology, University of Texas:

	Per cent.
Silica	28.60
Alumina	11.48
Oxide of iron	2.42
Lime	28.39
Carbonic acid	24.30
Loss on ignition	4.90
	100.09

KENDALL COUNTY.

Location—South of center.

County seat—Boerne; population, 886; elev. 1,405.

Area, square miles, 613.

Population, 4,517.

Railroads, 2.

Miles of railroad, 40.

Assessed valuation of property of all kinds, $3,709,981.

Mineral resources—Clays; limestone; gravel.

The mineral resources have not been investigated.

KENT COUNTY.

Location—Northwest Texas.

County seat—Clairemont; population, 150; elev. 2,127; lat. 33° 10′; long. 100° 45′; mag. dec. 10° 21′.

Area, square miles, 777.

Population, 2,655.

Railroads, 1.

Miles of railroad, 17.21.

Assessed valuation of property of all kinds, $2,375,317.

Mineral resources—Unknown.

KERR COUNTY.

Location—Southwest of the center.

County seat—Kerrville; population, 1,834; elev. 1,645; lat. 30° 1′; long. 99° 8′; mag. dec. 8° 39′.

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Area, square miles, 1,210.

Population, 5,505.

Railroads, 1.

Miles of railroad, 18.35.

Assessed valuation of property of all kinds, $4,218,010 (includes 45 sq. mi. now in Real county).

Mineral resources—Clays; limestone; petroleum.

The mineral resources have not been investigated. High grade petroleum, in small amounts, have been found on the James Spicer ranch, northwest of Kerrville.

KIMBLE COUNTY.

Location—Southwest of center.

County seat—Junction City; population, 536; lat. 30° 29′; long. 99° 53′; mag. dec. 9° 17′.

Area, square miles, 1,302.

Population, 3,261.

Railroads, none.

Assessed valuation of property of all kinds, $2,634,286.

Mineral resources—Clays; limestone.

The mineral resources have not been investigated.

KING COUNTY.

Location—Northwest Texas.

County seat — Guthrie; population, 160; elev. ——: lat. 33° 37′; long. 100° 19′; mag. dec. 10° 55′.

Area, square miles, 928.

Population, 810.

Railroads, none.

Assessed valuation of property of all kinds, $1,768,098.

Mineral resources—Clays; gypsum.

The mineral resources have not been investigated. The copper ores are Permian and have not been developed.

KINNEY COUNTY.

Location—Southwest Texas.

County seat—Brackettsville; population, 925; elev. 1,100; lat. 29° 19′; long. 100° 25′; mag. dec. 9° 19′.

Area, square miles, 1,269.

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Population, 3,401.
Railroads, 1.
Miles of railroad, 50.57.
Assessed valuation of property of all kinds, $4,592,800.
Mineral resources—Clays; limestone.
The mineral resources have not been investigated.

KLEBERG COUNTY.

Location—South Texas.
County seat—Kingsville; population, 975; elev. 66.
Area, square miles, 1,012.
Population (included in that for Nueces county).
Railroads, 1.
Miles of railrod, 21.
Assessed valuation of property of all kinds, $6,578,394.
Mineral resources—Clays.
The mineral resources have not been investigated.

KNOX COUNTY.

Location—Northwest Texas.
County seat—Benjamin; population, 400; elev. 1,456.
Area, square miles, 947.
Population, 9,625.
Railroads, 2.
Miles of railroad (1913), 43.89.
Assessed valuation of property of all kinds, $6,259,477.
Mineral resources—Clays; copper ores; gypsum; sandstone.
The mineral resources have not been thoroughly investigated. The copper ores are Permian and have not been developed.

LAMAR COUNTY.

Location—Northeast Texas; borders on the Red river.
County seat—Paris; population, 11,269; elev. 565; lat. 33° 41′; long. 95° 35′; mag. dec. 8° 4′.
Area, square miles, 903.
Population, 46,544.
Railroads, 5.
Miles of railroad (1913), 97.
Assessed valuation of property of all kinds, $26,815,985.

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Mineral resources—Clays; limestone, mineral waters; gravel.

The red and brown-burning clays are represented by the average of two analyses of samples from Paris, as follows:

	Per cent.
Silica	65.60
Alumina	18.87
Oxide of iron	2.77
Lime	0.17
Magnesia	1.47
Soda	1.67
Potash	0.68
Titanic acid	2.05
Sulphuric acid	1.16
Water	5.26
	99.70
Total fluxes	6.77

These clays became viscous at a temperature of about 2,300 deg. F.

The quality of the brick made in this county is given by the following tests on a sample from Paris, several years old:

Weight per cubic foot, pounds	120.6
Per cent. of cells by volume	22.97
Volume of cells in 100 parts by weight	11.88
Pounds of water absorbed per cu. ft.	14.32
Crushed at, pounds per sq. inch	3,156

The composition of the mineral water from the Blossom Mineral Water Company, Blossom, is as follows:

	Grains per U. S. Gal.
Silica	2.45
Iron	0.023
Calcium	28.69
Magnesium	6.65
Sodium and Potassium	55.99
Carbonate radicle (CO_3)	None
Bicarbonate radicle (HCO_3)	6.18
Sulphate radicle (SO_4)	189.01
Chlorine	5.19
Total solids	296.78

This analysis was marked, "Government Analysis."

LAMB COUNTY.

Location—Northwest Texas; south of the Panhandle.

County seat—Olton; population, 150; elev. 3,615.

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Area, square miles, 1,021.
Population, 540.
Railroads, 1.
Miles of railroad, 32.81.
Assessed valuation of property of all kinds, $3,187,014.
Mineral resources—Unknown.

LAMPASAS COUNTY.

Location—Center of the State.

County seat—Lampasas; population, 2,119; elev. 1,025; lat. 31° 1′; long. 98° 10′; mag. dec. 8° 36′.

Area, square miles, 755.
Population, 9,532.
Railroads, 2
Miles of railroad, 57.98.
Assessed valuation of property of all kinds, $6,975,710.
Mineral resources—Celestite (sulphate of strontium); clays; limestone; sandstone; petroleum.

The mineral resources have not been fully investigated. Fine samples of celestite are found near Lampasas and Lometa. Many varieties of limestone occur. At any near Chaddick's Mill, on the Colorado river, west of Lometa, there are heavy exposures of a medium and fine grained gray sandstone of the following composition and qualities:

	Per cent.
Silica	85.20
Alumina	7.82
Oxide of iron	4.68
Lime	1.09
Carbonic acid	1.10
Loss on ignition	0.30
	100.19

Weight per cubic foot, pounds	137.30
Pounds of water absorbed per cu. ft.	9.94
Crushed at, pounds per sq. inch	3,111

In the southwestern part of the county a little petroleum has been found at shallow depths.

LA SALLE COUNTY.

Location—South Texas.

County seat—Cotulla; population, 1,880; elev. 442; lat. 28° 27′; long. 99° 14′; mag. dec. 8° 51′.

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Area, square miles, 1,770.
Population, 4,747.
Railroads, 3.
Miles of railroad, 91.50.
Assessed valuation of property of all kinds, $4,854,480 (unofficial).
Mineral resources—Clays; gravel.

LAVACA COUNTY.

Location—Southeast Texas.
County seat—Hallettsville; population, 1,379; elev. 232; lat. 29° 27′; long. 96° 57′; mag. dec. 8° 35′.
Area, square miles, 992.
Population, 26,418.
Railroads, 1.
Miles of railroad, 60.40.
Assessed valuation of property of all kinds, $17,229,373.
Mineral resources—Clays; sandstone; mineral waters; gravel.
At Moulton, the Moulton Sandstone Company has operated a good sandstone quarry for a number of years. The composition of this stone is given by the average of two analyses, as follows:

	Per cent.
Silica	86.10
Alumina	2.29
Oxide of iron	0.93
Lime	0.44
Magnesia	1.03
Soda	4.67
Potash	2.04
Carbonic acid	0.35
Sulphuric acid	0.75
Loss on ignition	1.03
	99.63

The average quality of this stone, as determined by several tests, is as follows:

Weight per cubic foot, pounds	137.80
Pounds of water absorbed per cu. ft.	10.48
Crushed at, pounds per sq. inch	4,311

The absorption of water, in pounds per cubic foot, varied from 3.28 to 14.89. The crushing strength, in pounds per square inch, varied from 2,400 to 8,791.

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Composition of water from St. Mary's Mineral Well, Hallettsville:

	Grains per U. S. Gal.
Calcium sulphate	37.30
Calcium bicarbonate	31.13
Calcium chloride	190.20
Magnesium chloride	40.40
Sodium chloride	133.70
Sodium bicarbonate	78.70
	511.40

LEE COUNTY.

Location—Southeast of center.

County seat — Giddings; population, 1,375; elev. 512; lat. 30° 10′; long. 96° 57′; mag. dec. 8° 34′ (1912).

Area, square miles, 666.

Population, 13,132.

Railroads, 2.

Miles of railroad, 55.15.

Assessed valuation of property of all kinds, $6,631,660.

Mineral resources—Clays; lignite; gravel.

The sandy brick clays are represented by an analysis of a sample from near Giddings, as follows:

	Per cent.
Silica	81.50
Alumina	5.43
Oxide of iron	3.60
Lime	1.30
Magnesia	0.25
Soda	1.56
Potash	0.49
Titanic acid	0.87
Water	4.00
	99.00
Total fluxes	7.20

This clay did not burn steel hard at a temperature of 2,246 deg. F.

The lignite from this county is represented by analyses of samples from Hicks and from Blue Branch, as follows:

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	Hicks.	Blue Branch.
Moisture	12.60	16.50
Volatile combustible matter	44.75	36.07
Fixed carbon	33.90	37.17
Ash	8.75	10.26
	100.00	100.00
Sulphur	0.63	1.66
British thermal units per pound		9,774

These analyses do not represent the freshly mined lignite as it is probable that the moisture content would be about 30 per cent.

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CHAPTER IV.

DISCUSSION OF COUNTIES—Continued.

Leon—Rusk.

LEON COUNTY.

Location—East of center; west of the Trinity river.

County seat—Centerville; population, 400; lat. 31° 15′; long. 95° 59′; mag. dec. 8° 31′ (1911).

Area, square miles, 1,066.

Population, 16,583.

Railroads, 3.

Miles of railroad, 110.99.

Assessed valuation of property of all kinds, $8,110,567.

Mineral resources—Clays; lignite, gravel.

The clays have not been investigated. The lignite industry is well conducted at and near Jewett by the Bear Grass Coal Co. and the Houston County Coal & Manufacturing Co. The average composition of the lignites of this county is given in the following analysis:

	Per Cent.
Moisture	27.91
Volatile combustible matter	35.81
Fixed carbon	25.89
Ash	10.39
	100.00
Sulphur	0.82
British thermal units, per pound	7,136

LIBERTY COUNTY.

Location—Southeast Texas.

County seat—Liberty; population, 980; elev. 30; lat. 30° 4′; long. 94° 48′; mag. dec. 7° 42′.

Area, square miles, 1,162.

Population, 10,686.

Railroads, 5.

Miles of railroad, 120.37.

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Assessed valuation of property of all kinds, $9,181,455.

Mineral resources—Clays; petroleum; natural gas; gravel.

The clays have not been investigated. The natural gas from oil wells is used locally. The oil fields came into production in 1905 and yielded, to the close of 1913, 328,136 barrels of oil, valued at $199,235.

LIMESTONE COUNTY.

Location—Northeast of center.

County seat—Groesbeck; population, 1,454; elev. 477; lat. 31° 31′; long. 96° 31′; mag. dec. 8° 36′.

Area, square miles, 987.

Population, 34,621.

Railroads, 3.

Miles of railroad, 82.75.

Assessed valuation of property of all kinds, $15,438,450.

Mineral resources—Clays; lignite; limestone; natural gas; gravel.

The pottery clays are represented by an analysis of a sample from near Headsville, as follows:

	Per Cent.
Silica	70.82
Alumina	18.90
Oxide of iron	0.40
Soda	0.50
Titanic acid	2.10
Water	6.80
	99.52
Total fluxes	0.90

This clay became steel hard at a temperature of 2,246 deg. F.

The fire-clay is represented by an analysis of a sample from near Headsville, as follows:

	Per Cent.
Silica	77.4
Alumina	15.7
Oxide of iron	0.7
Titanic acid	0.7
Water	5.7
	100.2
Total fluxes	0.70

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The lignite from Head's Prairie gave:

	Per Cent.
Moisture	12.00
Volatile combustible matter	42.00
Fixed carbon	32.00
Ash	14.00
	100.00

The limestones are worked at Tehuacana by the Mexia Quarry Company. Several analyses and tests of this stone have been made, as follows:

	Per Cent	
	Gray.	Soft Yellow.
Silica	4.80	5.50
Alumina	1.29	1.67
Oxide of iron	1.35	1.53
Lime	50.02	48.69
Carbonic acid	39.40	37.00
Loss on ignition	2.70	5.00
	99.56	99.39
Weight per cu. ft. pounds	158.1	127.0
Pounds of water absorbed per cu. ft.	2.76	13.4
Crushed at, pounds per sq. inch.	6,222	5,555

Another sample gave:

Weight per cu. ft. pounds	168.48
Pounds of water absorbed per cu. ft.	0.59
Crushed at, pounds per sq. inch	10,140

Stone from Tehuacana has been tested by the United States Office of Public Roads, Washington, with the following results:

Weight per cubic foot, pounds	169
Pounds of water absorbed per cu. ft.	2.28

The composition of this sample, as determined in the laboratory of the Bureau of Economic Geology and Technology by J. E. Stullken, is as follows:

	Per Cent.
Silica	5.40
Alumina	7.33
Oxide of iron	1.67
Lime	44.79
Carbonic acid	36.60
Loss on ignition	4.96
	100.75

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A good quality of natural gas occurs in large volumes near Mexia, and it is piped to Teague, Corsicana and Waco, the total mileage being 85.

LIPSCOMB COUNTY.

Location—Northeast corner of the Panhandle; borders on Oklahoma.

County seat—Lipscomb; population, 110; lat. 36° 15′; long. 100° 15′; mag. dec. 11° 9′.

Area, square miles, 850.

Population, 2,634.

Railroads, 1.

Miles of railroad, 10.84.

Assessed valuation of property of all kinds, $3,616,250.

Mineral resources—Unknown.

LIVE OAK COUNTY.

Location—South Texas; traversed by the Nueces river.

County seat—Oakville; population, 431; elev. 90.

Area, square miles, 1,123.

Population, 3,442.

Railroads, 1.

Miles of railroad, 50.

Assessed valuation of property of all kinds, $4,393,860.

Mineral resources—Clays; gravel.

LLANO COUNTY

Location—Near center; traversed by the Llano river; west of the Colorado river.

County seat—Llano; population, 1,687; elev. 1,029; lat. 30° 44′; long. 98° 41′; mag. dec. 9° 24′.

Area, square miles, 977.

Population, 6,520.

Railroads, 1.

Miles of railroad, 20.36.

Assessed valuation of property of all kinds, $6,604,840.

Mineral resources—Amethyst; bat guano; dolomite; gold; granite; graphite; iron ores; pearls; serpentine; rare minerals, such as fergusonite, gadolinite, gummite, mackintoshite, nivenite, rolandite, thorogummite; limestone; marble; sandstone, granite, gravel.

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While the mineral resources of Llano county are of a diversified character, very little is being done towards their development. The only mineral product now marketed is granite. Many attempts have been made to mine gold ore, but no returns are now available as to the success attained. The same remark applies to the copper ores. A good quality of graphite occurs along the line of the Austin & Northwestern Ry., near Graphite Station, but it has not been developed.

Excellent iron ores occur at Iron Mountain, about 12 miles northwest of Llano, at the old Olive mine, and elsewhere, but it has been many years since any shipment was made.

Some Llano county iron ore was used by the Sloss Steel & Iron Company, Birmingham, Alabama, and a little by the State Furnace at Rusk, Cherokee County. The ores are high grade hematites, magnetites and limonites, the two former occurring among the granites and gneisses and the latter in limestone. The hematites and magnetites carry from 60 to 65 per cent of iron and appear to be lenticular in form. With the exception of the old Olive mine, these deposits lie from 10 to 15 miles away from transportation.

The deposit of rare minerals at Barringer Hill has not been worked for several years.

Llano county has many excellent deposits of limestone and sandstone and some of the marble appears to be of fine texture and quality, but no quarries are in operation.

This county has long been famous for the excellent quality of its gray granite and several quarries are in commission. The Federal Building in Kansas City, Missouri, was partly constructed of a gray granite which occurs alamost within the limits of the town of Llano.

The composition of a sample of gray granite from Bradshaw's quarry was as follows:

	Per cent.
Silica	70.20
Alumina	17.36
Peroxide of iron	1.32
Protoxide of iron	1.90
Lime	1.46
Magnesia	0.20
Soda	4.30
Potash	2.90

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	Per cent.
Phosphoric acid	0.06
Water	0.70
	100.40

Weight per cubic foot, pounds	167.23
Pounds of water absorbed per cubic foot	0.35
Crushed at, pounds per square inch	10,060

A sample of gray granite from Teich's quarry had the following composition:

	Per Cent.
Silica	72.80
Alumina	15.40
Peroxide of iron	2.15
Protoxide of iron	0.40
Lime	1.60
Magnesia	1.00
Soda	2.70
Potash	2.30
Phosphoric acid	0.05
Water	0.45
	98.85

Weight per cubic foot, pounds	165.98
Pounds of water absorbed per cu. ft.	0.47
Crushed at, pounds per square inch	11,950

A sample of medium grained red granite from Teich's quarry had the following composition:

	Per Cent.
Silica	78.00
Alumina	1.23
Peroxide of iron	1.30
Lime	0.15
Magnesia	0.60
Soda	3.40
Potash	4.34
Phosphoric acid	0.04
Water	0.20
	100.38

Weight per cubic foot, pounds	163.49
Pounds of water absorbed per cubic foot	0.48
Crushed at, pounds per square inch	11,990

Beginning about 3 miles northeast of Llano and continuing for several miles in a northeasterly direction, there is a heavy exposure of a fine-grained, dense and extremely hard feldspar porphyry which has been termed "opal granite" from the numerous inclusions of a bluish quartz in small oval pieces. It is dif-

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ficult to cut and polish, but makes a very handsome and durable stone. Its composition is as follows:

	Per Cent.
Silica	74.90
Alumina	11.10
Peroxide of iron	1.60
Protoxide of iron	1.50
Manganese dioxide	1.90
Lime	0.20
Soda	8.50
Titanic acid	0.50
Water	0.30
	100.50

Weight per cubic foot, pounds	164.73
Pounds of water absorbed per cu. ft.	0.59
Crushed at, pounds per square inch	15,300

Among petrographers this stone is known as llanite.

A medium grain red granite proposed to be crushed and used as road material and concrete had a crushing strength of 11,800 pounds per square inch. A sample of granite from Kramer's quarry had a crushing strength of 8,888 pounds per square inch.

LOVING COUNTY (UNORGANIZED).

Location—West Texas; south of New Mexico; east of the Pecos river.

County seat—

Area, square miles, 873.

Population, 249.

Railroads, none.

Assessed valuation of property of all kinds, $384,887.

Mineral resources—Unknown.

LUBBOCK COUNTY.

Location—Northwest Texas.

County seat—Lubbock; population, 1,938; elev. 3,148; lat. 33° 36′; long. 101° 52′; mag. dec. 10° 36′.

Area, square miles, 982.

Population, 3,624.

Railroads, 2.

Miles of railroad, 59.79.

Assessed valuation of property of all kinds, $4,971,301.

Mineral resources—Unknown.

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LYNN COUNTY.

Location—Northwest Texas.
County seat—Tahoka; population, 575; elev. 3,043.
Area, square miles ,821.
Population, 1,713.
Railroads, 1.
Miles of railroad, 35.48.
Assessed valuation of property of all kinds, $2,082,007.
Mineral resources—Unknown.

McCULLOCH COUNTY.

Location—West of center; south of the Colorado river.
County seat—Brady; population, 2,669; elev. 1,670; lat. 31° 8′; long. 99° 21′; mag. dec. 9° 42′.
Area, square miles, 1,100.
Population, 13,405.
Railroads, 2.
Miles of railroad, 70.98.
Assessed valuation of property of all kinds, $7,529,916.
Mineral resources—Coal; natural gas; limestone; petroleum; sandstone; gravel.

The mineral resources have not been fully investigated. The Central Coal Fields cross the Colorado river and come into this county, but no mines are in operation. Petroleum and natural gas occur in the county, but have not been developed to much extent.

Good lubricating oil occurs in comparatively shallow wells near Lohn, northwest of Brady.

McLENNAN COUNTY.

Location—Northeast of center.
County seat—Waco; population, 26,425; elev. 414; lat. 31° 36′; long. 97° 8′; mag. dec. 8° 24′.
Area, square miles, 1,080.
Population, 73,250.
Railroads, 8.
Miles of railroad, 224.84.
Assessed valuation of property of all kinds, $54,701,370.
Mineral resources—Clays; limestone; petroleum; gravel.

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The red and brown-burning clays are represented by an analysis of a sample from Waco, as follows:

	Per Cent.
Silica	72.36
Alumina	7.84
Oxide of iron	1.72
Lime	6.48
Magnesia	2.23
Soda	1.70
Potash	1.20
Titanic acid	0.12
Water	3.72
Carbonic acid	3.30
	100.67
Total fluxes	13.33

This clay became steel hard somewhat above 2,102 deg. F.

The calcareous brick clays are represented by an analysis of a sample from East Waco, as follows:

	Per Cent.
Silica	71.40
Alumina	8.20
Oxide of iron	2.30
Lime	6.34
Magnesia	2.44
Soda	1.60
Potash	1.22
Titanic acid	0.14
Water	3.70
Carbonic acid	3.25
	100.50
Total fluxes	14.90
Point of fusion	2,138 Deg. F.

The brick made are represented by tests made on samples received from F. A. Harris, Waco, as follows:

	Stiff mud.	No marks.
Weight per cu. ft. pounds	122.8	131.7
Per cent. of cells by volume	13.94	17.69
Volume of cells in 100 parts by weight	7.08	8.38
Pounds of water absorbed per cu. ft.	8.69	11.00
Crushed at, pounds per sq. inch	1,898	6,000

The oil resources have not been developed, although a high paraffin oil was found by Wm. L. Prather, of Waco, in 1890, on the Bosque, at a depth of 265 feet. This was the first discovery of oil in the central part of the State, antedating the Navarro (Corsicana) field by nearly four years. The existence of a paraffin oil 54 miles west of south from Corsicana, although

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at a shallow depth, is a noteworthy fact, and one that should long since have induced systematic drilling.

A sample of limestone from Crawford had the following composition:

	Per cent.
Silica	Trace
Alumina	0.60
Oxide of iron	Trace
Lime	55.60
Carbonic acid	43.68
	100.08
Weight of a cubic foot, pounds	158.49
Pounds of water absorbed per cu. ft.	9.1
Crushed at, pounds per square inch	3,180

This is the purest limestone that has been found in the State.

McMULLEN COUNTY.

Location—South Texas; traversed by the Nueces river.

County seat—Tilden; population, 506.

Area, square miles, 1,180.

Population, 1,091.

Railroads, 1.

Miles of railroad, 16.

Assessed valuation of property of all kinds, $2,331.997.

Mineral resources—Clays; lignite; natural gas; petroleum; gravel.

The clays have not been investigated. On the R. S. Franklin ranch, along the San Miguel river, southwest of Christine, there is a large deposit of a fine white clay closely resembling the white clay found near Gonzales, Gonzales county.

Lignite occurs on and near the San Miguel river, in the vicinity of the iron bridge on the road from Pleasanton to Tilden. Some prospecting work has been done here, but no mines have been operated. The seam, as exposed, runs to about five feet in thickness and appears to be of fair quality.

Natural gas bubbles up through the San Miguel river on the Franklin ranch, southwest of Christine.

In the northeast part of the county, at Crowther, there is an oil and gas field of considerable promise. Several wells have been sunk and storage tanks provided. A sample of natural gas from Crowther carried 947 British thermal units per cubic foot. It is used locally.

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MADISON COUNTY.

Location—East of the center; between the Navasota and the Trinity rivers.

County seat—Madisonville; population, 1,000; lat. 30° 57′; long. 95° 55′; mag. dec. 8° 11′.

Area, square miles, 488.

Population, 10,318.

Railroads, 4.

Miles of railroad, 34.17.

Assessed valuation of property of all kinds, $4,694.670.

Mineral resources—Clays; gravel.

The mineral resources have not been investigated.

MARION COUNTY.

Location—Northeast Texas; borders on Louisiana.

County seat—Jefferson; population, 2,515; elev. 191; lat. 32° 46′; long. 94° 21′; mag. dec. 7° 31′.

Area, square miles, 384.

Population, 10,472.

Railroads, 4.

Miles of railroad, 48.35.

Assessed valuation of property of all kinds, $3,962,294.

Mineral resources—Clays; iron ore; lignite; limestone; natural gas; petroleum; sandstone; pearls; gravel.

The clays are represented by three analyses, as follows:

	1	2	3
Silica	62.40	58.20	76.00
Alumina	20.66	23.97	9.45
Oxide of iron	8.54	4.43	4.75
Lime	0.40	None	Trace
Magnesia	Trace	None	None
Soda	7.77	5.02	4.00
Potash	1.12	2.09	2.00
Water	....	5.36	4.70
Total	100.89	99.07	100.90
Total fluxes	17.83	11.54	10.75

1. Thomas Ferrell's bank, A. Richardson headright.
2. W. C. Hill, on Daingerfield road.
3. J. Higgins' yard, near Jefferson.

Lignite occurs on Big Cypress creek and on the north side of Caddo Lake, but the seams, as exposed, are thin. No analysis

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can be quoted. It is said that in a deep well at Jefferson three beds of brown coal were penetrated.

Petroleum and natural gas occur in and around Caddo Lake, and these fields appear to be the westward continuation of the Caddo and Oil City fields in Louisiana. To the close of 1913 Marion county had produced 553,366 barrels of oil, valued at $494,744.

Some good pearls have been found in Caddo Lake.

Aside from the possibilities in oil and gas, the principal mineral resource of Marion county is the large deposits of brown iron ore (limonite) that occur in the northwestern part of the county, at Lasater, Orr's Switch, near Ore City, etc.

During the last eighteen months considerable shipments have been made to Philadelphia, the ore, as per cargo sampling, carrying about 55 per cent in iron, without washing or calcining. A standard-gauge railroad, more than thirty miles in length, has been constructed from Longview to and beyond Ore City. An iron ore dock, capable of handling 3,500 to 4,000 tons of ore per day, has been built by the Gulf, Colorado & Santa Fe Railway, at Port Bolivar, Galveston Bay, and coastwise shipments have been made from the deposits near Ore City.

In common with practically all of the brown ores in this part of the State, the deposits in Marion county appear to be of blanket form. They occur on and near the tops of the hills and ridges, the topography of the region being extremely favorable to the construction of railroad lines for opening and working the beds. For the most part the cover (over-burden) is light and consists of soil, earth and sandy, friable clays. Ores carrying from 50 to 55 per cent in iron can be mined and loaded for 75 to 85 cents a ton. The all-rail rate to tidewater is $1.00 a ton.

The iron furnace at Jefferson was built in 1889-90. It was 60x12 feet and was blown in March, 1891. It was a charcoal furnace and had an annual capacity of 13,500 tons. It has not been in operation for some years. The carwheel iron produced had a good reputation, being made from local ores. The rolling mill, built in 1891, has long since been dismantled. The iron ore area in the county may be taken at 27 square miles.

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MARTIN COUNTY.

Location—West Texas.
County seat—Stanton; population, 650; elev. 2,654.
Area, square miles, 900.
Population, 1,549.
Railroads, 1.
Miles of railroad, 12.58.
Assessed valuation of property of all kinds, $2,603,143.
Mineral resources—Unknown.

MASON COUNTY.

Location—Southwest of center; traversed by the Llano river.
County Seat—Mason; population, 1,137; elev., 1450; lat. 30° 45′; long. 99° 14′; mag. dec. 9° 58′.
Area, square miles, 968.
Population, 5,683.
Railroads, none.
Assessed valuation of property of all kinds, $4,522,020.
Mineral resources—Clays; granite; graphite; iron ore; manganese ore; mica; tin ore (reported); topaz; gravel.

Owing to the fact that there is no railroad in this county, the mineral resources have not received much attention. There has been no development in the county. Good manganese ore is found at the old Spiller mine, east of the town of Mason.

Some good iron ore is known to occur in the county, and it is of the same general character as that of Llano county. A variety of iron ore new to the State has recently been found in Mason. It is of a deep purple color, somewhat greasy to the feel, and is a typical hematite. It is comparatively soft and would make a high-grade and permanent iron paint when properly ground in oil. The composition of this ore is as follows:

	Per cent.
Silica	10.68
Alumina	5.67
Metallic iron	54.60
Lime	0.59
Sulphuric acid	0.58
Loss on ignition	2.92

In the northeast part of the county, near Pontotoc, prospecting for mica has been carried on of late, and some good material

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has been found. The occurrence of tin ore on Herman and Willow creeks was reported several years ago, but no vein or other deposit has been located.

The granites of the county are similar to those of Llano and Burnet counties.

Near Streeter, a little south of west from Mason, a beautiful variety of white and faintly bluish topaz is found, which has been cut and placed on the market. No typical straw-colored topaz has been found. It is reported that a few good pearls have been found in the Llano River, but the industry is of a sporadic character. Such pearls as have been obtained came from Unios (fresh water mussels).

MATAGORDA COUNTY.

Location—Southeast Texas; borders on the Gulf of Mexico.

County seat — Bay City; population, 3,156; elev. 55 lat. 28° 59′; long. 95° 55′; mag. dec. 8° 7′.

Area, square miles, 1,135.

Population, 13,594.

Railroads, 4.

Miles of railroad, 156.96.

Assessed valuation of property of all kinds, $16,172,645.

Mineral resources—Clays; natural gas; petroleum; salt.

The clays have not been investigated. The natural gas, found in association with petroleum, is used locally.

The oil fields came into production in 1904 and to the close of 1913 yielded 2,219,995 barrels of oil, valued at $1,403,862.

As this county borders on the Gulf of Mexico and lies well within the coastal plain, it is probable that other oil fields will be discovered, together with commercial supplies of natural gas.

The quality of the brick made in this county is shown by tests on samples received from the Bay City Brick & Tile Co., Bay City, as follows:

	Graham Face.	Gulf Coast Common.
Weight per cu. ft., lbs.	115.80	116.90
Per cent. of cells by volume	26.60	27.90
Volume of cells in 100 parts, by weight	14.34	14.90
Pounds of water absorbed per cu. ft.	16.60	17.41
Crushed at, pounds per square inch	2,424	1,431

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MAVERICK COUNTY.

Location—Southwest Texas; borders on the Rio Grande.

County seat—Eagle Pass; population, 3536; elev. 735; lat. 28° 44′; long. 100° 30′; mag, dec. 9° 28′.

Area, square miles, 1,332.

Population, 5,151.

Railroads, 1.

Miles of railroad, 28.47.

Assessed valuation of property of all kinds, $6,132,661.

Mineral resources—Clays; coal; natural gas; gravel.

The clays have not been investigated.

From the Fleming and Davidson well, at depth of 712 feet, a good flow of natural gas was encountered. The sample examined gave 300 B. t. u. per cubic foot, and contained an unusual amount of nitrogen.

Much coal has been mined in this county by the International Coal Mines Co. and the Olmos Coal Co. This latter company operates the only coal washing plant in the State. The average composition of the coal mined in this county is given by the following analyses:

	International Coal Mines Co. Per cent.	Olmos Coal Company. Lump. Per cent.
Moisture	4.85	8.83
Volatile combustible matter	38.30	32.68
Fixed carbon	46.30	44.89
Ash	10.55	13.60
	100.00	100.00
Sulphur	2.04	0.90
B. t. u. per pound	11,128	10.941

During the months of September and October, 1911, 800 tons of International coal were sold to Fort Sam Houston, San Antonio. It had the following average composition:

	Per cent.
Moisture	2.15
Volatile combustible matter	33.10
Fixed carbon	57.25
Ash	7.50
	100.00
Sulphur	1.25
B. t. u., per pound	13,591

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MEDINA COUNTY.

Location—South of center.

County seat—Hondo; population, 1,325; elev. 887; lat. 29° 19′; long. 99° 5′; mag. dec. 8° 43′.

Area, square miles, 1,284.

Population, 13,415.

Railroads, 2.

Miles of railroad, 55.87.

Assessed valuation of property of all kinds, $11,251,455.

Mineral resources—Clays; lignite; natural gas; petroleum; gravel.

The calcareous brick clays are represented by an analysis of a sample from near D'Hanis, as follows:

	Per cent.
Silica	51.12
Alumina	11.04
Oxide of iron	4.10
Lime	14.24
Magnesia	0.90
Soda	1.59
Potash	0.40
Titanic acid	0.95
Water	4.00
Carbonic acid	10.62
	98.97
Total fluxes	21.23

This clay became viscous at a temperature of 2,102 degrees F. The quality of the brick made in this county is shown by the following tests on a sample received from the D'Hanis Brick & Tile Co.:

Weight per cubic foot, pounds	122.6
Per cent. of cells by volume	11.58
Volume of cells in 100 parts by weight	5.89
Pounds of water absorbed per cubic foot	7.22
Crushed at, pounds per square inch	3,340

A considerable amount of lignite is mined in Medina county, near Lytle. The following average analyses give the quality:

	Carr Mine. Per cent.	Bertetti Mine. Per cent.
Moisture	27.39	28.34
Volatile combustible matter	35.07	41.49
Fixed carbon	28.16	21.63
Ash	9.38	8.54
	100.00	100.00
Sulphur	0.88	0.87
B. t. u. per pound	7,485	7.846

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Some natural gas and petroleum have been found in wells drilled near Dunlay, but no production is credited.

MENARD COUNTY.

Location—West of center.
County seat—Menard; population, 450; elev. 1,870; lat. 30° 54′; long. 99° 51′; mag. dec. 8° 40′.
Area, square miles, 888.
Population, 2,707.
Railroads, 1.
Miles of railroad, 15.85.
Assessed valuation of property of all kinds, $2,584,055.
Mineral resources—Unknown.

MIDLAND COUNTY.

Location—West Texas.
County seat—Midland; population, 2,192; elev. 2,769.
Area, square miles, 972.
Population, 3,464.
Railroads, 1.
Miles of railroad, 26.51.
Assessed valuation of property of all kinds, $5,734,287.
Mineral resources—Unknown.

MILAM COUNTY.

Location—Southeast of center.
County seat—Cameron; population, 3,263; elev. 390; lat. 30° 52′; long. 96° 58′; mag. dec. 8° 18′.
Area, square miles, 1,044.
Population, 36,780.
Railroads, 3.
Miles of railroad, 107.10.
Assessed valuation of property of all kinds, $19,574,487.
Mineral resources—Clays; lignite; gravel; petroleum.

The buff-burning semi-refractory clays are represented by the following average of three analyses of samples from near Rockdale:

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	Per cent.
Silica	69.33
Alumina	19.38
Oxide of iron	1.07
Lime	0.87
Magnesia	0.86
Soda	0.12
Potash	Trace
Titanic acid	1.40
Water	5.46
	98.49
Total fluxes	2.87

The red and brown-burning clays are represented by an analysis of a sample from near Rockdale, as follows:

	Per cent.
Silica	72.90
Alumina	14.70
Oxide of iron	4.50
Lime	0.60
Magnesia	0.30
Soda	0.70
Potash	1.50
Titanic acid	1.00
Water	4.20
	99.50
Total fluxes	7.60

This clay burned steel hard at a temperature of 2,174 degrees F.

The fire clay is represented by an analysis of a sample from near Milano Junction, as follows:

	Per cent.
Silica	57.40
Alumina	28.84
Oxide of iron	0.72
Lime	0.10
Magnesia	0.10
Soda	0.47
Potash	Trace
Titanic acid	1.48
Water	10.44
	99.55
Total fluxes	1.39

This clay became steel hard at a temperature of 2,102 degrees F. It is one of the best fire clays in the State, but is not used.

Milam county has long been a heavy producer of lignite. The industry centers around Rockdale. The average composition of the lignites from this county is as follows:

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	Per cent.
Moisture	31.22
Volatile combustible matter	33.99
Fixed carbon	25.83
Ash	8.96
	100.00
Sulphur	1.18
B. t. u. per pound	7,268

MILLS COUNTY.

Location—Near center.

County seat—Goldthwaite; population, 1,129; elev. 1,518; lat. 31° 27′; long. 98° 34′; mag. dec. 9° 3′.

Area, square miles, 700.

Population, 9,694.

Railroads, 1.

Miles of railroad, 34.87.

Assessed valuation of property of all kinds, $6,205,140.

Mineral resources—Clays; limestone; sandstone; gravel.

The mineral resources of Mills county have not been investigated.

MITCHELL COUNTY.

Location—West Texas.

County seat—Colorado; population, 1,840; elev. 2,067.

Area, square miles, 807.

Population, 8,956.

Railroads, 2.

Miles of railroad, 30.86.

Assessed valuation of property of all kinds, $6,366,848.

Mineral resources—Salt; gravel, limestone.

Mitchell county has been a steady producer of salt, obtained by evaporating the deep-seated brines at Colorado City.

MONTAGUE COUNTY.

Location—North Texas; borders on the Red river.

County seat—Montague; population, 284; elev. 1,075.

Area, square miles, 976.

Population, 25,123.

Railroads, 3.

Miles of railroad, 85.17.

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Assessed valuation of property of all kinds, $12,806,465.

Mineral resources—Asphalt rock; coal; sandstone.

The asphalt rocks are bituminous sandstones. They are best developed around St. Jo, on Sampson Ridge, Devil's Backbone, etc. Their average composition is as follows:

	Per cent.
Silica	88.00
Asphaltene	1.84
Petrolene	8.68
Sulphur	0.22

These deposits seldom exceed 3 feet in thickness. The overburden may be as much as 27 feet and consists of thinly-bedded sandstones, clays, sand and Cretaceous limestones. Interbedded with the bituminous sandstone and forming a "horse" in it, there is often a hard bluish limestone carrying a little bitumen. This limestone has the following composition:

	Per cent.
Silica	63.18
Alumina	2.04
Oxide of iron	Trace
Lime	20.52
Carbonic acid	11.50
Organic matter	3.08
	100.32

Bituminous coal is found at and near Bowie, but no coal has been produced in this county for some years. The composition of this coal was stated to be as follows:

	Per cent.
Moisture	2.30
Volatile combustible matter	34.48
Fixed carbon	61.28
Ash	0.60
	100.00
Sulphur	1.14

In spite of the fact that this sample carried less than 1 per cent of ash, it is not at all probable that coal of this composition can be obtained in commercial quantities.

MONTGOMERY COUNTY.

Location—Southeast Texas.

County seat—Conroe; population, 1,374; elev. 213; lat. 30° 19′; long. 95° 26′; 7° 56′.

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Area, square miles, 1,066.
Population, 15,679.
Railroads, 5.
Miles of railroad, 100.72.
Assessed valuation of property of all kinds, $10,889,510.
Mineral resources—Clays; petroleum (?); gravel; natural gas.

The clays have not been investigated. Inasmuch as this county lies immediately north of and adjacent to the Humble oil field in Harris County, it is likely to become an oil producing county.

At Renn natural gas carrying 822 B. t. u. per cubic foot was struck in February, 1915.

MOORE COUNTY.

Location—Near center of the Panhandle.
County seat—Dumas; population, 200; elev. 3,638; lat. 35° 52′; long. 101° 59′; mag. dec. 11° 54′.
Area, square miles, 885.
Population, 561.
Railroads, none.
Assessed valuation of property of all kinds, $2,204,116.
Mineral resources—Unknown.

MORRIS COUNTY.

Location—Northeast Texas.
County seat—Daingerfield; population, 1,100; elev. 397; lat. 33° 1′; long. 94° 43′; mag. dec. 7° 53′ (1910).
Area, square miles, 278.
Population, 10,439.
Railroads, 2.
Miles of railroad, 35.52.
Assessed valuation of property of all kinds, $2,558,149.
Mineral resources—Clays; iron ore; lignite; gravel.
The clays have not been investigated.

The iron ores (limonites) are found in the southeastern part of the county and are probably an extension of the ore fields of Marion and Cass counties. The quality of the ore is excellent, if one may judge from such analyses as have been published, the average metallic iron running to 54 per cent. The iron ore area may be taken at 15 square miles.

The average of two analyses of the lignite found in Morris

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county (Pruitt place), with a thickness of less than 2 feet, is as follows:

	Per cent.
Moisture	6.50
Volatile combustible matter	46.64
Fixed carbon	28.02
Ash	18.84
	100.00
Sulphur	2.22

MOTLEY COUNTY.

Location—Northwest Texas; south of the Panhandle.

County seat — Matador; population, 600; elev. ——; lat. 34° 0′; long. 100° 42′; mag. dec. 10° 13′.

Area, square miles, 984.

Population, 2,396.

Railroads, 1.

Miles of railroad, 20.

Assessed valuation of property of all kinds, $3,934,941.

Mineral resources—Unknown.

NACOGDOCHES COUNTY.

Location—East Texas; between the Angelina and the Attoyac rivers.

County seat—Nacogdoches; population, 3,369; elev. 283; lat. 31° 37′; long. 94° 38′; mag. dec. 8° 0′ (1911).

Area, square miles, 962.

Population, 27,406.

Railroads, 6.

Miles of railroad, 106.18.

Assessed valuation of property of all kinds, $9,528,490.

Mineral resources—Asphalt rock; clays; iron ore; natural gas; petroleum; mineral waters; gravel.

The asphalt rock resembles that found in Jasper county.

The pottery clays of this county are represented by an analysis of a sample from Nacogdoches, as follows:

	Per cent.
Silica	75.33
Alumina	14.73
Oxide of iron	1.10
Lime	0.05
Magnesia	1.61

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	Per cent.
Soda	0.10
Potash	0.64
Titanic acid	1.27
Water	4.50
	99.33
Total fluxes	3.50

This clay became steel hard at a temperature of 2,390 deg. F.

The iron ores have not been fully investigated, but such analyses as are available show that they do not carry above 46 per cent in iron, with about 20 per cent in silica.

The first oil wells in Texas to assume even a moderate commercial importance and the first oil pipe line were in Nacogdoches county. The oil was first noticed in 1867, but little or nothing was done until about 1887. Between this year and 1890 one company alone drilled forty wells, all of them shallow. In 1890 thirty oil wells were in operation. The center of the industry was near Oil Spring and Chireno and a 3-inch pipe line was built to Aaron's Hill, near Nacogdoches, a distance of 14½ miles.

Four miles northeast of Oil Spring a well drilled to a depth of 70 feet flowed from 250 to 300 barrels a day, but soon afterwards became a "pumper."

No oil has been produced in Nacogdoches county for many years, but it would appear that systematic drilling could be undertaken with strong probability of success.

The oil found in 1887-1890 was excellent for lubricating purposes. It had an asphalt base, did not lose its mobility at a temperature below zero F., and did not gum on exposure to the air.

NAVARRO COUNTY.

Location—Northeast of center.

County seat—Corsicana; population, 9,749; elev. 418; lat. 32° 5′; long. 96° 29′; mag. dec. 8° 26′ (1910).

Area, square miles, 1,136.

Population, 47,070.

Railroads, 4.

Miles of railroad, 132.57.

Assessed valuation of property of all kinds, $26,818,845.

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Mineral resources—Clays; natural gas; petroleum; limestone; gravel.

The red and brown-burning clays are represented by an analysis of a sample from near Corsicana, as follows:

	Per cent.
Silica	55.28
Alumina	21.27
Oxide of iron	8.37
Lime	3.90
Magnesia	0.28
Soda	Trace
Potash	None
Titanic acid	1.05
Water	4.26
Carbonic acid	3.30
Organic matter	1.43
	99.14
Total fluxes	12.55

This clay became steel hard at a temperature of 1,922 deg. F.

The quality of the brick made is shown by tests on a sample from the Corsicana Brick Co., as follows:

	Light red.
Weight per cu. ft., pounds	117.10
Per cent. of cells by volume	26.01
Volume of cells in 100 parts, by weight	13.87
Pounds of water absorbed per cu. ft.	16.24
Crushed at, pounds per square inch	4,400

The Corsicana oil field came into production in 1896, and to the close of 1913 had yielded 6,151,034 barrels of oil, valued at $4,734,762.

The Powell oil field came into production in 1900, and to the close of 1913 yielded 3,884,623 barrels of oil, valued at $2,287,825.

The total oil production of Navarro county, to the close of 1913, was 10,035,657 barrels, valued at $7,022,587.

The natural gas is used locally.

The limestones have not been fully investigated. About 10 miles southeast of Corsicana, near Richland, there is a bluish limestone of the following composition and qualities:

	Per cent.
Silica	2.90
Alumina	1.41
Oxide of iron	0.31
Lime	51.36

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	Per cent.
Carbonic acid	39.40
Loss on ignition	3.90
	99.28
Weight per cu. ft., pounds	164.7
Pounds of water absorbed per cu. ft.	0.95
Crushed at, pounds per square inch	9,424

NEWTON COUNTY.

Location—East Texas; borders on Louisiana.

County seat—Newton; population, 575; elev. 172; lat 30′ 51°; long. 93° 44′; mag. dec. 7° 33′ (1912).

Area, square miles, 903.

Population, 10,850.

Railroads, 3.

Miles of railroad, 92.97.

Assessed valuation of property of all kinds, $6,068,308.

Mineral resources—Clays; lignite; gravel.

The mineral resources of Newton county have not been investigated.

NOLAN COUNTY.

Location—Northwest of center.

County seat—Sweetwater; population, 4,176; elev. 2,164; lat. 32° 28′; long. 100° 24′; mag. dec. 10° 25′ (1910).

Area, square miles, 828.

Population, 11,999.

Railroads, 4.

Miles of railroad, 91.29.

Assessed valuation of property of all kinds, $8,267,676.

Mineral resources—Clays; gypsum; gravel.

The mineral resources of Nolan county have not been investigated.

NUECES COUNTY.

Location—South Texas; borders on the Gulf of Mexico.

County seat—Corpus Christi; population, 8,222; elev. 35; lat. 27° 47′; long. 97° 24′; mag. dec. 8° 21′.

Area, square miles, 1,108.

Population, 21,955 (includes Jim Wells and Kleberg counties).

Railroads, 5.

Miles of railroad, 74.21.

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Assessed valuation of property of all kinds, $17,886,190.

Mineral resources—Clays; natural gas; petroleum; gravel.

The mineral resources of Nueces county have not been fully investitgated, but it is probable that both oil and gas exist there. The bringing in of the great gas well at White Point, in San Patricio County, 7 miles across the bay from Corpus Christi, has aroused additional interest in the possibilities of this county.

OCHILTREE COUNTY.

Location—North line of the Panhandle.

County seat — Ochiltree; population, 450; elev. 2,700; lat. 36° 17′; long. 100° 48′; mag. dec. 11° 10′.

Area, square miles, 864.

Population, 1,602.

Railroads, none.

Assessed valuation of property of all kinds, $1,515,291.

Mineral resources—Unknown.

OLDHAM COUNTY.

Location—West line of the Panhandle; borders on New Mexico.

County seat — Tascosa; population, 192; elev. 3,176; lat. 35° 33′; long. 102° 14′; mag. dec. 11° 53′.

Area, square miles, 1,470.

Population, 812.

Railroads, 2.

Miles of railroad, 66.61 (1913).

Assessed valuation of property of all kinds, $3,616,758.

Mineral resources—Unknown.

ORANGE COUNTY.

Location—Extreme southeast Texas; borders on Louisiana.

County seat—Orange; population, 5,527; elev. 10; lat. 30° 3′; long. 101° 13′; mag. dec. 9° 46′.

Population, 9,528.

Railroads, 4.

Miles of railroad, 67.29.

Assessed valuation of property of all kinds, $8,283,548.

Mineral resources—Natural gas; petroleum; clays; gravel.

The clays have not been investigated.

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This county entered the list of oil producing counties in 1913, and produced during that year 17,706 barrels of oil, valued at $19,123.

PALO PINTO COUNTY.

Location—North of center.

County seat—Palo Pinto; population, 482; elev. 1,000; lat. 32° 46′; long. 98° 17′; mag. dec. 9° 9′.

Area, square miles, 971.

Population, 19,506.

Railroads, 2.

Miles of railroad, 58.59.

Assessed valuation of property of all kinds, $10,865,370.

Mineral resources—Clays; coal; limestone; sandstone; natural gas; mineral waters; gravel; petroleum.

The clays have not been investigated.

The average composition of the coal mined at Strawn by the Strawn Coal Mining Company is as follows:

	Per cent.
Moisture	2.51
Volatile combustible matter	35.68
Fixed carbon	46.34
Ash	15.47
	100.00
Sulphur	3.08
B. t. u. per pound	11,778

This is also about the composition of the coal mined at Mt. Marion by the Mt. Marion Coal Mining Co.

The Mineral Wells Crushed Stone Company operates a limestone quarry at Mineral Wells, furnishing stone for ballast, road making, bitulithic paving, etc. Several analyses and tests have been made, as follows:

Silica	0.60	0.80	3.14	5.18
Alumina	0.44	none	none	0.50
Oxide of iron	0.76	1.05	1.95	1.80
Lime	51.25	52.50	48.93	48.25
Magnesia	....	0.59	0.33	1.38
Carbonic acid	40.25	40.10	38.96	37.90
Sulphuric acid	....	0.88	0.35	1.72
Loss on ignition	4.45	4.00	4.04	3.52
	97.75	99.92	97.70	100.25

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The weight per cu. ft. varied from 165.1 to 169 pounds. The amount of water absorbed per cu. ft. varied from 0.06 to 0.15 lb. The crushing strain, in pounds per square inch, varied from 14,000 to 16,000.

The composition of the water from the Indian Wells Water Company, Mineral Wells, is as follows:

	Grains per U. S. Gal.	
	Fresh from the well.	Condensed (52-1)
Potassium chloride	5.50	378.28
Sodium nitrate	0.88	15.19
Sodium carbonate	1.85	138.24
Sodium sulphate	252.28	11,442.88
Magnesium sulphate	8.05	310.53
Calcium sulphate	....	17.82
Magnesium bicarbonate	14.97	.....
Calcium bicarbonate	23.43	.....
Silica	0.99	9.91
Alumina	5.65	18.07
Iron oxide	Trace	Trace
	342.04	14,072.27

Analysis by W. T. Read, University of Texas.

Analyses of the Lamar Well waters, from Mineral Wells, as furnished by the company, are as follows:

	Grains per U. S. Gal.
Bicarbonate of iron	0.50
Bicarbonate of lime	25.90
Chloride of potassium	2.50
Chloride of sodium	33.90
Carbonate of sodium	None
Sulphate of magnesia	155.00
Sulphate of soda	210.50
Bicarbonate of soda	44.70
	473.00

Analysis by F. B. Porter.

O. K., or Sleepy Water.

Carbonate of lime	8.96
Chloride of magnesia	Trace
Sulphate of magnesia	16.21
Carbonate of magnesia	1.08
Chloride of potassium	Trace
Sulphate of soda	7.72
Chloride of sodium	13.45
Carbonate of soda	6.35
Silica	0.58
Alumina and iron	Trace
Volatile matter	5.12
	59.47

Analysis by P. S. Tilson.

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Mineral Wells Splits. (Concentrated Water).	
Bicarbonate of iron	11.60
Bicarbonate of lime	1.40
Potassium chloride	11.40
Sodium chloride	137.60
Sodium carbonate	2.70
Magnesium sulphate	1004.40
Sodium sulphate	2919.10
Calcium chloride	82.50
	4,070.70

The composition of Sangcura water, the Gibson Well Water Co., Mineral Wells:

	Grains per U. S. Gal.
Potassium chloride	0.43
Sodium chloride	22.96
Sodium sulphate	215.30
Sodium bicarbonate	9.57
Magnesium bicarbonate	21.19
Calcium bicarbonate	20.88
Alumina	0.50
Oxide of iron	0.02
Silica	1.63
	292.46

Analysis by J. R. Bailey, University of Texas.

The composition of Sangcura Water No. 3, or BB water:

	Grains per U. S. Gal.
Potassium chloride	4.26
Sodium chloride	83.67
Sodium nitrate	0.02
Sodium carbonate	1.02
Sodium sulphate	202.95
Magnesium sulphate	107.55
Calcium sulphate	28.17
Calcium bicarbonate	45.72
Oxide of iron	0.03
Alumina	0.54
Silica	0.46
	474.39

Analysis by W. T. Read, University of Texas.

The composition of Gibson water:

	Grains per U. S. Gal.
Sodium chloride	20.08
Sodium sulphate	256.59
Sodium carbonate	29.06
Calcium carbonate	15.65
Magnesium carbonate	6.18

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	Grains per U. S. Gal.
Oxide of iron and alumina	0.87
Silica	1.19
	329.62
Carbonic acid gas, cu. in. per U. S. gal.	4.26

Analysis by E. T. Dumble.

The composition of what is known as Lamar White Sulphur Water is as follows, according to P. S. Tilson:

	Grains per U. S. Gal.
Calcium sulphate	12.14
Calcium carbonate	21.43
Magnesium chloride	Trace
Magnesium sulphate	64.50
Magnesium carbonate	Trace
Potassium chloride	Trace
Sodium sulphate	175.72
Sodium chloride	13.43
Sodium carbonate	9.10
Alumina and iron	Trace
Silica	1.66
Volatile matter	15.30
	313.28

The composition of American Vichy Water, from Mineral Wells, is as follows:

	1	2
Sodium sulphate	195.791	226.976
Sodium chloride	18.425	24.308
Potassium sulphate	3.170	17.310
Calcium	....	6.350
Calcium bicarbonate	13.261	....
Magnesium	....	4.648
Magnesium carbonate	5.338	....
Silica	10.221	1.500
Magnesium sulphate	11.523	....
Carbonic acid	13.998	36.960
Alumina	....	8.500
	271.727	326.552

Analysis furnished by the company.

Composition of Crazy Well Water, Mineral Wells:

	Grains per U. S. Gallon.			
	1	2	3	4
Potassium chloride	4.65	15.32	3.90	5.19
Sodium chloride	43.43	49.50	11.12	24.21
Sodium nitrate	3.35	20.43	0.32	0.35
Sodium carbonate	0.74	1.23	3.21	2.39
Sodium sulphate	59.36	110.35	194.48	267.44

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	Grains per U. S. Gallon.			
Magnesium sulphate....	39.94	38.89	43.98	7.73
Magnesium bicarbonate.	9.63	12.20	0.63	13.04
Calcium bicarbonate....	36.30	30.62	35.08	19.24
Oxide of iron.....	Trace	Trace	Trace	Trace
Alumina	5.41	5.35	3.43	0.22
Silica	1.40	1.34	1.34	1.16
	204.21	285.23	297.49	341.27

Analysis by W. T. Read, University of Texas.

The composition of Min-Ala Water, from Mineral Wells, is as follows:

	Grains per U. S. Gallon.	
Sodium sulphate.....	196.640	273.202
Sodium chloride.....	19.360	23.070
Calcium sulphate.....	32.309	16.832
Potassium sulphate.....	21.772	1.108
Magnesium sulphate.....	8.329	8.648
Silica	11.500	11.500
Carbonic acid.....	30.005	30.080
	319.915	364.440

Analysis furnished by the company.

The composition of Star Well Water, Mineral Wells, is as follows:

	Grains per U. S. Gal.
Hydrous magnesium sulphate.....	18.833
Hydrous sodium sulphate.....	150.053
Hydrous calcium sulphate.....	6.547
Calcium carbonate.....	2.084
Magnesium carbonate.....	4.663
Sodium chloride.....	23.982
Calcium chloride.....	5.574
Potassium chloride.....	1.281
Alumina and iron.....	1.644
Silica	1.853
Organic matter, volatile matter and loss	9.805
	226.319

Traces of iodine and ammonia.
Analysis by A. Merrill, St. Louis.

The opening of a promising oil field a few miles west of Strawn, announced in January, 1915, has aroused considerable interest. The oil is of high grade.

PANOLA COUNTY.

Location—East Texas; borders on Louisiana.

County seat — Carthage; population, 1,350; elev. 292; lat. 32° 10′; long. 94° 20′; mag. dec. 7° 40′ (1911).

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Area, square miles, 814.

Population, 20,424.

Railroads, 3.

Miles of railroad, 49.

Assessed valuation of property of all kinds, $4,701,200.

Mineral resources—Asphalt rock; iron ore; lignite; limestone; sandstone.

The asphalt rocks are similar to those found in Jasper county (q. v.)

While the iron ores of the county have not been fully investigated, yet the analyses to hand show that their content in metallic iron is comparatively low. Out of six analyses of samples from different localities, two gave 50 and over in iron, and four ranged from 42 to 48 per cent.

Near Beckville there is a 4½ foot seam of lignite of the following composition:

	Per cent.
Moisture	20.80
Volatile combustible matter	52.08
Fixed carbon	22.67
Ash	4.45
	100.00
Sulphur	0.48

The clays have not been fully investigated. The average composition of clays found near Carthage is as follows:

	Per cent.
Silica	75.40
Alumina	9.78
Oxide of iron	4.38
Soda	5.01
Potash	1.56
Water	4.00
	100.13
Total fluxes	10.95

PARKER COUNTY.

Location—North of center.

County seat — Weatherford; population, 5,074; elev. 1,000; lat. 32° 45′; long. 97° 49′; mag. dec. 9° 4′.

Area, square miles, 888.

Population, 26,331.

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Railroads, 4.

Miles of railroad, 71.95.

Assessed valuation of property of all kinds,$13,486,760.

Mineral Resources—Clays; coal; limestone; gravel.

The pottery clays are represented by average analyses of samples from Rock Creek, about 15 miles west of Weatherford, as follows:

	Per cent.
Silica	55.25
Alumina	19.80
Oxide of iron	4.60
Lime	0.73
Magnesia	4.51
Soda	1.73
Potash	2.21
Titanic acid	1.31
Water	4.78
Carbonic acid	4.17
Organic matter	0.91
	100.00
Total fluxes	13.80

There is a considerable variation in the content of carbonic acid, viz.: from 0.30 to 8.04 per cent. These clays have a low fusing point, but become steel hard at a temperature of 1,994 deg. F.

The quality of the brick is shown by the following tests on samples received from the Acme Pressed Brick Co., Fort Worth, works at Millsap:

	Weight per cu. ft. lbs.	Percent of cells by Vol.	Volume of cells in 100 parts by weight.	Pounds of water absorbed per cu. ft.	Crushed at lbs. per sq. inch.
1	149.50	5.39	2.25	3.36	7,517
2	134.50	23.90	11.88	15.97	6,717
3	137.70	9.92	4.50	6.20	4,204
4	135.10	17.49	8.08	10.91	5,997
5	152.00	3.89	1.60	2.43	3,161
6	146.30	3.85	1.64	2.39	4,661
7	151.40	2.43	1.00	1.51	5,135
8	147.40	7.55	2.99	4.42	5,056

Explanation.

1. Millsap red.
2. Acme No. 1.
3. Acme No. 100.
4. Acme No. 27.
5. Acme No. 102.
6. Acme No. 104.
7. Acme No. 106.
8. Acme No. 113.

The composition of the coal that has been mined in Parker county is given by the following average of four analyses:

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	Per cent.
Moisture	6.10
Volatile combustible matter	32.49
Fixed carbon	45.83
Ash	15.58
	100.00
Sulphur	2.10
B. t. u. per, pound	11,358

No coal is now mined in this county.

PARMER COUNTY.

Location—Northwest Texas, on west line of State.

County seat—Farwell; population, 200; elev. 4,095.

Area, square miles, 873.

Population, 1,555.

Railroads, 1.

Miles of railroad, 50.74.

Assessed valuation of property of all kinds, $.....

Mineral resources—Unknown.

PECOS COUNTY.

Location—Trans-Pecos Texas; west of the Pecos river.

County seat—Fort Stockton; population, 439; elev. 2,948; lat. 30° 54′; long. 102° 50′; mag. dec. 10° 54′.

Area, square miles, 5,536.

Population, 2,071.

Railroads, 2.

Miles of railroad, 78.41.

Assessed valuation of property of all kinds, $8,072,010.

Mineral resources—Asphalt rock; limestone; natural gas; petroleum; sulphur; gravel.

The mineral resources of Pecos County have not been fully investigated. A bituminous limestone occurs at what is known as the "Oil Seep," 15 miles northeast of Fort Stockton. It had the following composition:

	Per cent.
Silica	12.68
Alumina	2.80
Oxide of iron	0.76
Lime	44.74
Carbonic acid	35.39
Bitumen	3.20

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The oil that exuded at this locality was of a very dark brown color. It was viscous and had a specific gravity of 0.920 (22.2 B.) at 60 deg. F. On distillation it yielded 11.77 per cent of pale amber oil up to 496 deg. F. It gave 45.54 per cent of an asphaltic mass. A well drilled at this locality to a depth of 1,200 feet reported "almost pure sulphur" as follows:

Depth, feet.	Thickness, feet.
200-250	50
400-525	125

The log of this well mentions "quartz rock with oil" from a depth of 40 ft. to 200 ft.; "quartz rock with oil and sulphur" from 250 ft. to 400 ft.; "quartz rock with crystallized sulphur" from 540 ft. to 600 ft. As no examination of the drillings was made it is impossible to say what was meant by these various terms, but it is probable that the so-called "sulphur" was in the form of pyrite.

Another well, close by, did not confirm the sulphur record of this well, although it was drilled to a depth of 423 feet. A little gas was found in these wells, but no oil in commercial amounts.

This locality is in Section 19, Block 140. In Section 114, Block 8, 5 miles south of the place once known as Santa Lucia, and on the I N K Ranch, a heavy black oil was found at a depth of 62 feet. This place is about 10 miles northwest of the "Oil Seep."

Two or three comparatively deep wells have been drilled in this part of Pecos county, but no oil or gas in commercial amounts was found. It is likely that if any commercial oil or gas is found it will be at depths not yet reached by any drilling operations in the county, possibly not above the 2,500 to 3,000-foot level.

POLK COUNTY.

Location—Southeast Texas; west of the Trinity River.

County seat—Livingston; population, 1,024; elev. 236; lat. 30° 43′; long. 94° 56′; mag. dec. 7° 40′.

Area, square miles, 1,100.

Population, 17,459.

Railroads, 6.

Miles of railroad, 90.66.

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Assessed valuation of property of all kinds, $8,436,144.

Mineral resources—Clays; gravel.

The sandy brick clays are represented by an analysis of a sample from near Hortense, as follows:

	Per cent.
Silica	70.00
Alumina	18.60
Oxide of iron	4.50
Lime	Trace
Magnesia	Trace
Soda	0.90
Potash	Trace
Titanic acid	0.60
Water	6.10
	100.70
Total fluxes	5.40

This clay became steel hard at a temperature of 2,102 degrees F.

The clays of easy fusibility are represented by an analysis of a sample from near Carmona, as follows:

	Per cent.
Silica	68.34
Alumina	15.28
Oxide of iron	3.44
Lime	1.20
Magnesia	0.88
Soda	3.55
Potash	2.47
Titanic acid	0.52
Water	4.70
	100.38
Total fluxes	11.54

This clay became viscous at a temperature of 2,174 degrees F.

POTTER COUNTY.

Location—Near center of the Panhandle.

County seat—Amarillo; population, 9,957; elev. 3,676; lat. 35° 13′; long. 101° 51′; mag. dec. 11° 47′.

Area, square miles, 874.

Population, 12,424.

Railroads, 4.

Miles of railroad, 88.63.

Assessed valuation of property of all kinds, $12,577,135.

Mineral resources—Unknown, except salt and possibly potash salts.

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The mineral resources of Potter county have not been investigated. Drilling for oil and gas was carried on during the year 1914 under conditions that appeared to be encouraging. Heavy beds of rock salt have been found in a deep well 23 miles northwest of Amarillo, with decided indications of beds of potash salts.

A Bulletin on this subject entitled "Potash in the Texas Permian" has been prepared by Dr. Udden, of this Bureau.

PRESIDIO COUNTY.

Location—Trans-Pecos Texas; west of the Pecos river; borders on the Rio Grande.

County seat—Marfa; population, 494; elev. 4,688; lat. 30° 19′; long. 104° 1′; mag, dec. 10° 53′.

Area, square miles, 2,652.

Population, 5,218.

Railroads, 1.

Miles of railroad, 44.35.

Assessed valuation of property of all kinds, $5,762,793.

Mineral resources—Agate; coal; granite; lead ores; limestone; natural gas; onyx; silver ores; zinc ores; mineral waters; gravel.

The coal in Presidio county is in the southwestern part, adjoining the Rio Grande. The district is known as the San Carlos, and it is about 25 miles south of the Southern Pacific Railway at Chispa. In 1893-95 some hopes were entertained that this district could be developed, and a railroad was built from Chispa.

It was stated that there were two benches of coal, separated by 6 to 18 inches of slate. The lower bench was said to be 30 to 40 inches in thickness, the upper bench 32 inches. The following analyses were given:

Moisture.	Vol. combust. matter.	Fixed carbon.	Ash.	Sulphur.
1.00	39.05	49.05	10.00	Trace
0.94	34.48	58.96	5.62	0.64

It was stated that coking tests made on this coal at Connellsville, Pennsylvania, showed that 48-hour beehive coke gave 93.7 per cent fixed carbon and 6.3 per cent of ash.

Later investigations and analyses have not confirmed the earlier reports. No work has been done in this district for some years.

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It is possible that better and thicker coal is to be found nearer the Rio Grande than at the former localities, but faults and other disturbances of a more or less local character will have to be considered. A 600-foot well drilled north of this coal field gave a good pressure of natural gas, but the matter has not been followed up.

Below Alamito, on Alamito Creek and close to the projected line of the Kansas City, Mexico & Orient Railway, from Alpine to Presidio del Norte, there is a large deposit of a granitic flagstone. It occurs in slabs of varying thickness, ½-inch to 3 inches, is of a beautiful grayish black color, and takes a fine polish. The quality of this stone is shown by the following analyses and tests:

	Per Cent.
Silica	74.00
Alumina	14.00
Oxide of iron	1.00
Soda	6.20
Potash	3.90
	99.10

Weight per cubic foot, pounds	163.49
Pounds of water absorbed per cu. ft.	1.22
Crushed at, pounds per square inch	15,970

South of Marfa, from 12 to 15 miles, there is a deposit of a black onyx (carbonate of lime), which takes a fine polish and makes a beautiful stone for interior ornamental purposes.

The lead ores of Presidio county are worked at Shafter in connection with the silver mining operations there, but the output is not large. An excellent lead ore (galena) occurs on the west slope of the Chinati Mountains, and has been developed to some extent, shipments having been made to the smelter at El Paso. A fine galena also occurs in the Solitario, a wild and extremely rugged part of the county east of Fresno Canyon, and some miles north of Lajitas, a small settlement on the Rio Grande.

Zinc ores (chiefly carbonate) are found near Shafter, but have not been developed.

Silver mining has been carried on at Shafter for nearly 30 years, and practically all of the silver credited to the state since 1882, more than $7,000,000, was from this place. The ore is silver chloride for the most part, although some galena rich in silver also occurs. The average silver content of the Shafter ore is

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from $15.00 to $20.00 a ton, but "pockets" of much higher value are found. The underground workings now comprise more than 40 miles of shafts, drifts, levels, upraises, winzes, etc. The country rock is carboniferous limestone, and the silver (and lead) ore occurrs in more or less isolated "chambers" of varying dimensions, some of them very large.

RAINS COUNTY.

Location—Northeast Texas; north of the Sabine river.

County seat—Emory; population, 426; elev. 564; lat. 32° 51′; long. 95° 44′; mag. dec. 8° 16′ (1912).

Area, square miles, 252.

Population, 6,787.

Railroads, 2.

Miles of railroad, 25.51.

Assessed valuation of property of all kinds, $2,807,490.

Mineral resources—Clays; lignite.

Excellent brick and hollow building tile are made at Ginger by the Fraser Brick Company, but no analyses or tests can be given.

At Emory and seven miles east there is lignite, but it is not now worked. The composition is given by the following average of two analyses:

	Per cent.
Moisture	10.17
Volatile combustible matter	39.52
Fixed carbon	36.60
Ash	13.71
	100.00
Sulphur	0.95

RANDALL COUNTY.

Location—South line of the Panhandle.

County seat — Canyon; population, 1,400; elev. 3,566; lat. 35° 0′; long. 102° 0′; mag. dec. 11° 35′.

Area, square miles, 872.

Population, 3,312.

Railroads, 2.

Miles of railroad, 46.78.

Assessed valuation of property of all kinds, $4,617,764.

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Mineral resources—Unknown, with the possible exception of potash salts. See under Potter county for Bulletin on this subject.

REAGAN COUNTY.

Location—West Texas.
County seat—Stiles; population, 150.
Area, square miles, 1,190.
Population, 392.
Railroads, 1.
Miles of railroad, 31.92.
Assessed valuation of property of all kinds, $1,279,430.
Mineral resources—Unknown.

REAL COUNTY.

Location—Southwest Texas.
County seat—Leakey; population, 318; elev. 1,600.
Area, square miles, 700.8.
Population—(No official statistics. Created in 1913).
Railroads, none.
Assessed valuation of property of all kinds, no official statistics.
Mineral resources—Kaolin; limestone; gravel.

In Real county, about six miles west of Leakey, there is a large deposit of the only kaolin known to exist in the State. It has been mentioned under the name of the Edwards county kaolin, but the locality is now in Real, created from some adjoining counties in 1913.

While it is not probable that all of the deposit consists of high grade material, yet the quality of the better grades is so excellent that well known potters, after considerable experience with it, have said there was no better kaolin produced in the United States or imported from abroad.

The distance of the deposit from rail—45 miles—has been one of the reasons why there has been so little development of this material, but a railroad has been surveyed from Uvalde, a town on the Southern Pacific Railway, 90 miles west of San Antonio, and partly constructed.

The deposit occurs in Cretaceous limestone, and has been exploited, by auger-drilling, pitting, etc., to a depth of 80 feet in places. The composition of this kaolin is given by the following anaylsis:

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	Per cent.
Silica	45.50
Alumina	33.23
Oxide of iron	0.61
Hygroscopic water	6.42
Combined water	12.50
	98.26

RED RIVER COUNTY.

Location—Northeast Texas; borders on the Red River.

County seat—Clarksville; population, 2,065; elev. 442; lat. 33° 36′; long. 95° 3′; mag. dec. 7° 49′ (1912).

Area, square miles, 1,061.

Population, 28,564.

Railroads, 2.

Miles of railroad, 41.06.

Assessed valuation of property of all kinds, $12,408,328.

Mineral resources—Clays; gravel.

The sandy brick clays are represented by an analysis of a sample from Detroit, as follows:

	Per cent.
Silica	78.50
Alumina	10.50
Oxide of iron	3.60
Lime	0.45
Magnesia	0.23
Soda	0.40
Potash	0.90
Titanic acid	0.32
Water	4.22
	99.12
Total fluxes	5.58

This clay became steel hard at a temperature of 2,246 degrees F.

A sample of natural gas bubbling up in Red River, near the month of Cash Creek, gave 463 B. t. u. per cubic foot.

REEVES COUNTY.

Location—Trans-Pecos Texas; west of the Pecos River; south of New Mexico.

County seat—Pecos; population, 1,856; elev. 2,580; lat. 31° 26′; long. 103° 33′; mag. dec. 10° 30′.

Area, square miles, 2,610.

Population, 4,392.

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Railroads, 3.

Miles of railroad, 137.75.

Assessed valuation of property of all kinds, $8,593,312.

Mineral resources—Natural gas; petroleum; sulphur.

Oil and natural gas occur in the Toyah field, and a considerable number of wells have been drilled. The locality is distinctly favorable, but no producing wells have been brought in. The same remark applies to the San Martine field, in the southwestern part of the county. The sulphur deposits, similar to those in Culberson county, have not been developed.

REFUGIO COUNTY.

Location—Southeast Texas; borders on San Antonio Bay and Copano Bay.

County seat—Refugio; population, 609; elev. 50; lat. 28° 18′; long. 97° 14′; mag. dec. 8° 58′ (1912).

Area, square miles, 802.

Population, 2,814.

Railroads, 1.

Miles of railroad, 47.32.

Assessed valuation of property of all kinds, $4,914.604.

Mineral resources—Clays.

The clays have not been investigated. This is one of the coastal counties and may yield both oil and gas.

ROBERTS COUNTY.

Location—Near center of the Panhandle; traversed by the Canadian River.

County seat—Miami; population, 400; elev. 2,802; lat. 35° 42′; long. 100° 38′; mag. dec. 10° 52′.

Area, square miles, 860.

Population, 950.

Railroads, 1.

Miles of railroad, 17.75.

Assessed valuation of property of all kinds, $2,671,554.

Mineral resources—Unknown.

ROBERTSON COUNTY.

Location—East of the center.

County seat—Franklin; population, 869; elev. 443; lat. 31° 1′; long. 96° 30′; mag. dec. 8° 26′.

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Area, square miles, 913.
Population, 27,454.
Railroads, 3.
Miles of railroad, 127.
Assessed valuation of property of all kinds, $13,288,110.
Mineral resources—Clays; lignite; sandstone; gravel.

The clays of easy fusibility are represented by an analysis of a sample from near Calvert, as follows:

	Per cent.
Silica	83.50
Alumina	8.51
Oxide of iron	1.40
Lime	1.00
Magnesia	1.08
Soda	1.50
Potash	0.50
Titanic acid	1.05
Water	2.40
	100.94
Total fluxes	5.48

This clay did not burn steel hard under a temperature of 2,390 degrees F.

A good fire clay is found near Bremond. It has the following composition:

	Per cent.
Silica	83.00
Alumina	7.42
Oxide of iron	0.36
Lime	Trace
Magnesia	3.01
Soda	1.26
Potash	0.30
Titanic acid	0.70
Water	3.70
	99.75
Total fluxes	4.93

This clay did not burn steel hard at a temperature of 2,570 degrees F.

Robertson county has long been an important producer of lignite. The average composition of the lignite from this county is given by the following average of nine analyses:

	Per cent.
Moisture	30.34
Volatile combustible matter	32.48

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	Per cent.
Fixed carbon	27.87
Ash	9.31
	100.00
Sulphur	0.86
B. t. u. per pound	8,122

ROCKWALL COUNTY.

Location—North Texas.

County seat — Rockwall; population, 1,136; elev. 552; lat. 32° 45′; long. 96° 27′; mag. dec. 8° 44′ (1912).

Area, square miles, 171.

Population, 8,072.

Railroads, 1.

Miles of railroad, 13.58.

Assessed valuation of property of all kinds, $5,185,248.

Mineral resources—Clays; gravel.

The clays have not been investigated.

RUNNELS COUNTY.

Location—Northwest of the center.

County seat—Ballinger; population, 3,536; elev. 1,630; lat. 31° 45′; long. 99° 58′; mag, dec. 9° 2′.

Area, square miles, 1,073.

Population, 20,853.

Railroads, 3.

Miles of railroad, 62.37.

Assessed valuation of property of all kinds, $10,167,342.

Mineral resources—Clays; gypsum; limestone.

The mineral resources have not been investigated.

RUSK COUNTY.

Location—East Texas.

County seat—Henderson; population, 1,750; elev. 470; lat. 32° 11′; long. 94° 49′; mag, dec. 7° 58′.

Area, square miles, 915.

Population, 29,946.

Railroads, 5.

Miles of railroads, 53.47.

Assessed valuation of property of all kinds, $5,977,880.

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Mineral resources—Clays; iron ore; lignite; sandstone.

The pottery clays are represented by an analysis of a sample from near Henderson, as follows:

	Per cent.
Silica	69.80
Alumina	15.85
Oxide of iron	1.60
Lime	3.40
Magnesia	0.53
Soda	1.05
Potash	0.50
Titanic acid	0.17
Water	6.72
	99.62
Total fluxes	7.08

This clay burned steel hard at a temperature of 2,102 degrees F.

There is a bed of lignite at Graham's Lake, 12 miles west of Henderson, 3 to 6 feet thick, with the following composition:

	Per cent.
Moisture	13.51
Volatile combustible matter	45.36
Fixed carbon	32.44
Ash	8.69
	100.00
Sulphur	0.88

At Millville there is another outcrop of lignite.

The iron ores (limonites) have not been developed, although some of them are of good quality; as, for instance, two miles east of Henderson on the Pine Hill road; the Iron Mountain, at Gould; at Sulphur Spring; west side of Iron County, 2½ miles east of Glenfawn. Some of these ores carry as much as 54 per cent. of iron.

The quality of the brick made is shown by the following tests on a sample of furnace brick, several years old, made at Henderson:

Weight of a cubic foot, pounds	114.70
Per cent. of cells by volume	30.79
Volume of cells in 100 parts by weight	16.75
Pounds of water absorbed per cubic foot	19.21
Crushed at, pounds per square inch	1,700

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CHAPTER V.

DISCUSSION OF COUNTIES—Continued.

Sabine—Zavalla.

SABINE COUNTY.

Location—East Texas; borders on Louisiana.

County seat—Hemphill; population, 279; lat. 31° 21′; long. 93° 51′; mag. dec. 7° 27′ (1912).

Area, square miles, 577.

Population, 8,582.

Railroads, 2.

Miles of railroad, 35.65.

Assessed valuation of property of all kinds, $4,587,828.

Mineral resources—Clays; iron ore; lignite; sandstone.

The mineral resources have not been fully investigated. There are probably good clays, with some iron ore and lignite, but the deposits have not been examined.

SAN AUGUSTINE COUNTY.

Location—East Texas; east of the Attoyac and Angelina rivers.

County seat—San Augustine; population, 1,204; elev. 304; lat. 31° 31′; long. 94° 6′; mag. dec. 7° 30′ (1912).

Area, square miles, 570.

Population, 11,264.

Railroads, 2.

Miles of railroad, 34.31.

Assessed valuation of property of all kinds, $5,598,121.

Mineral resources—Asphalt rock; iron ore; lignite; sandstone. The asphalt rock is a bituminous sandstone closely resembling the rock in Jasper county. It has not been used commercially. The iron ores and lignite have not been investigated, although on the Sabine and Angelina rivers the seams of lignite vary in thickness from 6 to 15 feet. The average of two analyses of lignite from this county is as follows:

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	Per cent.
Moisture	13.10
Volatile combustible matter	37.24
Fixed carbon	41.22
Ash	8.44
	100.00
Sulphur	2.36

SAN JACINTO COUNTY.

Location—Southeast Texas; west of the Trinity river.

County seat—Cold Spring; population, 439; lat. 30° 35′; long. 95° 6′; mag. dec. 8° 11′ (1912).

Area, square miles, 636.

Population, 9,542.

Railroads, 3.

Miles of railroad, 16.70.

Assessed valuation of property of all kinds, $3,645,100.

Mineral resources—Agate; clays; gravel.

Moss agates of great beauty have been found in San Jacinto county. The clay deposits have not been investigated.

SAN PATRICIO COUNTY.

Location—Southeast Texas; borders on San Patricio Bay.

County seat—Sinton; population, 975; elev. 49; lat. 28° 1′; long. 97° 28′; mag. dec. 9° 0′ (1912).

Area, square miles, 685.

Population, 7,307.

Railroads, 3.

Miles of railroad, 76.

Assessed valuation of property of all kinds, $7,348,534.

Mineral resources—Agate; clays.

Moss agates have been found. The clay deposits have not been investigated.

In November, 1914, a very large flow of natural gas under heavy pressure was found in a deep well bored at White Point, 7 miles across the Bay from Corpus Christi. The flow was struck at a depth of about 2,200 feet, and the yield of gas was variously estimated at from 30,000,000 to 50,000,000 cubic feet per day. It was found to be impossible to control the well, and it soon became entirely unmanageable, wrecking the derrick and form-

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ing what in effect was a great mud volcano, comparable to the early experiences in the Caddo field, Louisiana.

Other wells are to be sunk in this field with every precaution to save the gas or oil, should they be found under like heavy pressure.

This is the first great gas well that has been found in the Gulf Coastal Plain.

SAN SABA COUNTY.

Location—Near center, west.

County seat—San Saba; population, 1,200; elev. 1,705; lat. 31° 11′; long. 98° 43′; mag, dec. 9° 7′.

Area, square miles, 1,150.

Population, 11,245.

Railroads, 1.

Miles of railroad, 34.97.

Assessed valuation of property of all kinds, $9,111,349.

Mineral resources — Limestone; marble; onyx; sandstone; gravel; petroleum(?).

San Saba county is rich in many varieties of limestone suitable for building and road purposes, lime-making, etc. At Mrs. Houston's, on Cherokee Creek, there is a limestone which might be used for lithographic work. No tests of this stone for such purposes has been made, but it appears to warrant further attention. The chemical composition of this stone is as follows:

	Per cent.
Silica	4.50
Alumina	0.40
Oxide of iron	0.60
Lime	49.29
Magnesia	3.15
Carbonic acid	41.59
Loss on ignition	0.41
	99.94

On the ranch of B. R. Russell, near the town of San Saba, there is a similar stone of the following composition:

	Per cent.
Silica	1.84
Alumina	0.10
Oxide of iron	0.60
Lime	53.36
Carbonic acid	41.93
Loss on ignition	1.27
	99.10

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On this same property there are deposits of reddish, dove-colored and whitish marble taking a fine polish, as also a beautiful silver-black and golden onyx. These latter stones are unequalled in attractiveness for interior ornamental purposes, but they have not been developed.

Two samples of pink marble from B. R. Russell's ranch, near San Saba, have been examined, as follows:

Silica	2.60	3.42
Alumina	0.30	2.42
Oxide of iron	0.15	0.78
Lime	37.00	39.79
Magnesia	15.00	9.41
Carbonic acid	43.24	41.64
Soda	1.40	.....
Potash	0.60	.....
Loss on ignition	0.22	2.10
	100.51	99.56
Weight of a cu. ft. lbs.	166.70	146.40
Pounds of water absorbed per cu. ft.	1.50	22.85
Crushed at, pounds per sq. in.	10,330	5,730

A sample of white marble, with streaks of blackish gray, was examined as follows:

	Per cent.
Silica	0.57
Alumina } Oxide of iron	0.21
Lime	55.50
Carbonic acid	43.30
	99.58
Weight of a cu. ft., pounds	167.28
Pounds of water absorbed per cu. ft.	0.53
Crushed at, pounds per sq. in.	20,925

Two other samples of San Saba marble have been examined, as follows—No. 1 from two miles south of Richland Springs, and No. 2 from twelve miles south of San Saba:

	1	2
Silica	0.20	0.16
Alumina } Oxide of iron	0.90	0.32
Lime	54.50	55.50
Carbonic acid	42.64	43.60
Loss on ignition	1.00	.....
	99.24	99.58

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	1	2
Weight of a cu. ft., pounds.	169.10	169.73
Pounds of water absorbed per cu. ft.	0.06	0.08
Crushed at, pounds per sq. in.	13,333	10,266

While some drilling and considerable development work has been conducted on the marble deposits of San Saba county, no commercial quarry has been opened. It would, however, appear that some of these beds are worthy of attention, especially the pink marble and the white.

SCHLEICHER COUNTY.

Location—West Texas; west of the center.

County seat—Eldorado; population, 300; lat. 30° 52′; long. 100° 39′; mag. dec. 9° 21′.

Area, square miles, 1,355.

Population, 1,893.

Railroads, none.

Assessed valuation of property of all kinds, $3,189,380.

Mineral resources—Unknown.

SCURRY COUNTY.

Location—Northwest Texas; southeast of the Staked Plains.

County seat — Snyder; population, 2,514; elev. 2,310; lat. 32° 43′; long. 100° 56′; mag, dec. 10° 36′.

Area, square miles, 821.

Population, 10,924.

Railroads, 2.

Miles of railroad, 78.03.

Assessed valuation of property of all kinds, $6,440,482.

Mineral resources—Unknown.

SHACKELFORD COUNTY.

Location—Northwest of the center.

County seat — Albany; population, 999; elev. 1,410; lat. 32° 43′; long. 99° 18′; mag, dec. 9° 36′.

Area, square miles, 926.

Population, 4,201.

Railroads, 1.

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Miles of railroad, 39.

Assessed valuation of property of all kinds, $3,663,204.

Mineral resources—Clays; coal; limestone; natural gas; petroleum; sandstone.

A fair quality of sub-bituminous coal is found near old Fort Griffin in the bed of the Brazos river, at low water.

A seam of coal has recently been found at depth of 675 feet on the Snalum ranch, 6 to 7 miles northeast of Albany.

The petroleum and natural gas fields at and near Moran are now being developed. The natural gas from this field is supplied to Moran, Albany and Cisco. The composition of a sample taken 16 miles from the wells was as follows:

	Per cent.
Methane	80.80
Nitrogen	19.20
	100.00
B. t. u. per cu. ft.	835.50

Samples of limestone from the Central Quarry Company, main office at Waco, gave the following analyses and tests:

	1	2	3	4	5
Silica	2.90	1.70	1.68	1.44	1.66
Alumina	0.60	0.80	0.11	0.74	2.03
Oxide of iron	0.94	0.78	1.09	0.86	0.11
Lime	51.69	52.51	52.56	50.80	52.24
Magnesia	.....	.....	.....	0.43	Trace
Carbonic acid	39.24	39.06	39.80	40.70	41.00
Sulphuric acid	.....	.....	.....	0.24	.....
Loss on ignition	3.15	4.30	3.90	4.20	2.06
	98.53	99.15	99.14	99.41	99.10
Weight per cu. ft., lbs.	160.90	158.60	153.30	148.50	163.60
Pounds of water absorbed per cu. ft.	2.31	3.20	5.13	7.06	1.52
Crushed at, lbs. per sq. in.	4,400	7,155	6,125	4,100	5,875

Some special tests have been made on clays and shales from the Blach ranch, 10 to 12 miles north of Albany, as follows: Average composition of six samples:

	Per cent.
Silica	62.70
Alumina	17.97
Oxide of iron	6.94
Lime	0.92

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	Per cent.
Magnesia	0.60
Soda	0.86
Potash	1.53
Titanic acid	0.24
Sulphuric acid	0.44
Water	8.05
	100.25

These clays and shales are suitable for the manufacture of ordinary and pressed brick, hollow tile, paving brick, sewer pipe, etc. They occur in large deposits, within easy reach of abundant water, and in a particularly attractive part of the county. Their distance from rail, 10 to 12 miles, has prevented their development. It is probable that this part of the county is underlaid by a fair quality of sub-bituminous coal at depths varying from 500 to 700 feet. The extension of the Moran oil and gas field to the north may bring this section of the county within commercial possibilities.

SHELBY COUNTY.

Location—East Texas; borders on Louisiana.

County seat — Center; population, 1,684; elev. 345; lat. 31° 48′; long. 94° 11′; mag. dec. 7° 47′.

Area, square miles, 814.

Population, 26,423.

Railroads, 4.

Miles of railroad, 88.30.

Assessed valuation of property of all kinds, $7,283,272.

Mineral resources—Bat guano; clays; fuller's earth; iron ore; lignite; limestone; sandstone; gravel.

Red and gray mottled and slip clays are found in Shelby county and have been utilized to some extent. No analyses or tests can be given.

A fuller's earth occurring on the property of G. L. Milledge, Timpson, gave J. C. Blake, A. & M. College, a bleaching power of 153, on refined cotton seed oil, as compared with English earth at 100.

The iron ores of Shelby county, so far as present information goes, are of too low grade to be used as a source of iron. The iron-gravel would probably make a good material for roads.

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SHERMAN COUNTY.

Location—On north line of the Panhandle.

County seat—Stratford; population, 510; elev. 3,690; lat. 36° 20′; long. 102° 4′; mag. dec. 11° 58′.

Area, square miles, 900.

Population, 1,376.

Railroads, 1.

Miles of railroad, 25.91.

Assessed valuation of property of all kinds, $3,399,211.

Mineral resources—Unknown.

SMITH COUNTY.

Location—Northeast Texas; east of the Neches River.

County seat—Tyler; population, 10,400; elev. 521; lat. 32° 21′; long. 95° 17′; mag. dec. 8° 8′ (1910).

Area, square miles, 984.

Population, 41,746.

Railroads, 3.

Miles of railroad, 109.

Assessed valuation of property of all kinds, $14,127,621.

Mineral resources—Clays; fuller's earth; iron ore; lignite; limestone; salt; sandstone; mineral waters; gravel.

The pottery clays are represented by an analysis of a sample from near Tyler (Liebreich Pottery Co.), as follows:

	Per cent.
Silica	78.22
Alumina	8.71
Oxide of iron	0.72
Lime	3.36
Magnesia	1.10
Soda	1.17
Potash	0.45
Titanic acid	0.17
Water	5.50
	99.40
Total fluxes	6.80

This clay burned steel hard at temperature of 2,174 degrees F.

Two other clays, the first from near Garden Valley and the second from near Tyler, had the following composition:

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	Per cent.	
	1	2
Silica	64.00	85.40
Alumina	24.17	10.02
Oxide of iron	3.23	2.18
Lime	Trace	0.10
Magnesia	Trace	None
Alkalies	3.50	Trace
Water	7.25	1.95
	102.15	99.65
Total fluxes	6.73	2.28

Brown iron ore (limonite) of fair quality is found at many localities in this county, but has not been developed. The total iron ore area may be taken at 81 square miles.

The salines of Smith county were worked extensively many years ago, especially during the Civil War. At the Steen Saline, five miles east of Lindale, three thousand men were employed. The wells were shallow, and the salt was recovered by evaporation in pans, kettles, etc. Twenty furnaces were in operation, and the output was 12,000 sacks a day. A bushel of salt was obtained from 190 gallons of the water. Limestone occurs on both sides of the saline. At the Brooks Saline, 17 miles southwest of Tyler and 9 miles west of Bullard, there was also some activity. Twelve furnaces were in operation, and the output was 100 sacks a day. A bushel of salt was obtained from 300 gallons of the water. Borings conducted here a few years ago gave a water saturated with salt and fragments of rock salt half an inch across were brought to the surface. Near this locality limestone of the following composition was quarried and used as a flux in the State (iron) furnace at Rusk, Cherokee county:

	Per cent.
Silica	6.20
Alumina	3.75
Oxide of iron	0.25
Lime	46.00
Magnesia	None
Carbonic acid	35.70
Loss on ignition	8.05
	99.95

Some native sulphur was also obtained from these borings.

Composition of Riviere Mineral Water, Tyler:

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	Grains per U. S. Gal.
Potassium sulphate	18.58
Lithium sulphate	2.27
Magnesium sulphate	69.83
Sodium sulphate	100.46
Calcium sulphate	116.85
Iron sulphate (ferrous)	170.89
Iron sulphate (ferric)	37.72
	516.60

Analysis by J. W. Mallet, University of Virginia.

SOMERVELL COUNTY.

Location—North of the center; traversed by the Brazos river.

County seat — Glenrose; population, 890; elev. 600; lat. 32° 13′; long. 97° 45′; mag. dec. 8° 44′ (1912).

Area, square miles, 200.

Population, 3,931.

Railroads, none.

Assessed valuation of property of all kinds, $1,297,755.

Mineral resources—Clays; limestone.

The mineral resources of Somervell county have not been investigated.

STARR COUNTY.

Location—Extreme southern part; borders on the Rio Grande.

County seat—Rio Grande City; population, 2,085.

Area, square miles, 1,223 (includes portion of Brooks county).

Population, 13,151.

Railroads, none.

Assessed valuation of property of all kinds, $2,564,515.

Mineral resources—Clays; coal; natural gas; petroleum.

The mineral resources have not been investigated. The Laredo coal field probably extends into this county, but nothing definite is known about it. Explorations for natural gas and petroleum have not yet resulted in the discovery of productive wells.

STEPHENS COUNTY.

Location—North a little west of the center.

County seat—Breckenridge; population, 750; elevation, 1,200; lat. 32° 46′; long. 98° 53′; mag, dec. 9° 43′.

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Area, square miles, 926.

Population, 7,980.

Railroad, 1.

Miles of railroad, 5.87.

Assessed valuation of property of all kinds, $4,707,071.

Mineral resources—Asphalt rock; clays; coal; limestone; sandstone; gravel.

The asphalt rock is the bituminous sandstone found in Montague and Cooke counties. The occurrence is in the bed of the Brazos river at low water. A similar rock is found in Coke county to the southeast, in a creek which empties into the Colorado river near Edith postoffice.

The clays have not been investigated.

Sub-bituminous coal of fair quality is found near Crystal Falls and Breckenridge, but no mining operations, except for purely local needs, have been conducted in some years. Tests of the coal from near Breckenridge have been made by the Texas Central Railway with satisfactory results. On Coal Branch, a few miles west of Crystal Falls, there is an outcrop of coal in two branches each 12 inches in thickness, with a parting of bone and slate from 3 to 6 inches thick. The composition of the entire seam of 24 inches of coal is as follows:

	Per cent.
Moisture	5.02
Volatile combustible matter	40.01
Fixed carbon	40.46
Ash	14.51
	100.00
Sulphur	5.12

From 20 to 25 years ago a good deal of work was done at the Jake Wizeart mine, near Crystal Falls, at the Berry Meadows mine; at the Wasson mine, on Albert Sidney Johnston property, etc. The extension of the Rock Island lines from Graham to Stamford, or of the Wichita Falls & Southern Railway from Newcastle to Cisco, would open the coal fields of Stephens county to good advantage.

From what is known of the coal seams it is not likely that any single bench would exceed 22 inches in thickness. The coal would probably carry from 12 to 15 per cent of ash and from 2 to 3.5

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per cent of sulphur. This is not a coking coal, but has fine steaming qualities, and the lump is suitable for domestic purposes. The coal of this part of the state belongs to the Carboniferous formation, whereas the coals along the Rio Grande (Laredo and Eagle Pass fields) are Tertiary or late Cretaceous.

Considering the rapid growth of this part of the state, west and northwest of Fort Worth, and the extension of lines of rail, such as the Rock Island, the Wichita Falls & Southern, the Wichita Valley, the Mineral Wells & Northwestern, the Texas Central and its northwest connections from Stamford, the Kansas City, Mexico & Orient, the Gulf, Texas & Western, etc., it would appear that the coals of Stephens, Young, Jack and Palo Pinto counties are worthy of much more detailed investigation than they have yet received.

The Bureau of Economic Geology has undertaken to prepare an exhaustive report on the coal measure in Texas, and this work will be prosecuted as rapidly as the necessary means are provided.

From Mr. David Cole, Caddo, we received a sample of red-brown marble (dolomitic) which had the following composition and qualites:

	Per cent.
Silica	0.63
Alumina	0.39
Oxide of iron	14.18
Lime	30.29
Magnesia	12.07
Carbonic acid	41.14
	98.70

Weight of a cubic foot, pounds	177.92
Pounds of water absorbed per cubic foot	1.79
Crushed at, pounds per square inch	12,200

This stone takes a good polish and is of an attractive color and texture.

STERLING COUNTY.

Location—West Texas.

County seat—Sterling City; population, 532; elec. 2,295; lat. 31° 51′; long. 101° 0′; mag. dec. 10° 34′.

Area, square miles, 975.

Population, 1,493.

Railroad, 1.

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Miles of railroad, 13.11.
Assessed valuation of property of all kinds, $2,070,764.
Mineral resources—Unknown.

STONEWALL COUNTY.

Location—Northwest Texas; east of the Staked Plains.
County seat—Aspermont; population, 600; elev. 1,773; lat. 33° 7′; long. 100° 13′; mag. dec. 11° 0′.
Area, square miles, 777.
Population, 5,320.
Railroads, 2.
Miles of railroad, 39.
Assessed valuation of property of all kinds, $4,210,340.
Mineral resources—Alabaster; clays; copper ores; gypsum.

There is alabaster of good quality in Stonewall county, as also beds of gypsum. The clays have not been investigated. The copper ores are Permian, occurring as rich nodules of chalcocite, etc., in clays, similar to other deposits throughout the Permian area.

SUTTON COUNTY.

Location—Southwest of center.
County seat — Sonora; population, 783; lat. 30° 35′; long. 100° 40′; mag. dec. 9° 32′.
Area, square miles, 1,517.
Population, 1,569.
Railroads, none.
Assessed valuation of property of all kinds, $2,966,423.
Mineral resources—Unknown.

SWISHER COUNTY.

Location—Northwest Texas; south of the Panhandle.
County seat — Tulia; population, 1,216; elev. 3,447; lat. 34° 34′; long. 101° 51′; mag. dec. 11° 17′.
Area, square miles, 850.
Population, 4,012.
Railroads, 1.
Miles of railroad, 30.99.
Assessed valuation of property of all kinds, $4,733,747.
Mineral resources—Unknown.

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TARRANT COUNTY.

Location—North Texas.

County seat—Fort Worth; population, 94,494; elev. 614; lat. 32° 45′; long. 97° 20′; mag. dec. 9° 5′.

Area, square miles, 900.

Population, 108,572.

Railroads, 12.

Miles of railroad, 287.71.

Assessed valuation of property of all kinds, $97,696,872.

Mineral resources—Clays; gravel; limestone.

The clays, gravels and limestones have not been fully investigated. The quality of the brick made in the county is shown by the following tests on samples received from the Cobb Brick Company, Fort Worth:

	Red.	Brown-Red.	Speckled.
Weight of a cubic foot, pounds	111.00	109.00	117.60
Per cent. of cells by volume	27.44	34.39	16.84
Volume of cells in 100 parts by weight	15.44	19.69	8.94
Pounds of water absorbed per cu. ft.	17.13	21.46	11.50
Crushed at, pounds per square inch	5,950	3,950	6,230

A sample of limestone received from W. S. Meller, Fort Worth, had the following composition and qualities:

	Per cent.
Silica	0.50
Alumina	0.44
Oxide of iron	0.76
Lime	53.77
Carbonic acid	42.20
Loss on ignition	1.86
	99.53
Weight of a cubic foot, pounds	159.40
Pounds of water absorbed per cu. ft.	1.84
Crushed at, pounds per square inch	5,000

TAYLOR COUNTY.

Location—Northwest of center.

County seat—Abilene; population, 9,204; elev. 1,719.

Area, square miles, 900.

Population, 26,293.

Railroads, 4.

Miles of railroad, 105.30.

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Assessed valuation of property of all kinds, $14,114,950.

Mineral resources—Clays; sandstone; mineral waters; gravel.

The mineral resources have not been investigated. There are some localities where drilling for oil and gas could be recommended, but there are no deep wells from which records are available.

TERRELL COUNTY.

Location—Trans-Pecos Texas (west of the Pecos river).

County seat—Sanderson; population, 450; elev. 2,775; lat. 30° 9′; long. 102° 26′; mag. dec. 10° 16′.

Area, square miles, 2,776.

Population, 1,430.

Railroads, 1.

Miles of railroad, 61.82.

Assessed valuation of property of all kinds, $3,828,624.

Mineral resources—Clays; limestone.

The mineral resources have not been investigated. Many excellent limestones are found contiguous to the Southern Pacific Railway.

TERRY COUNTY.

Location—West Texas; south of Staked Plains.

County seat—Brownfield; population, 275.

Area, square miles, 828.

Population, 1,474.

Railroads, none.

Assessed valuation of property of all kinds, $1,909,552.

Mineral resources—Unknown.

THROCKMORTON COUNTY.

Location—Northwest of center.

County seat—Throckmorton; population, 500; lat. 33° 11′; long. 99° 10′; mag. dec. 9° 45′.

Area, square miles, 821.

Population, 4,563.

Railroads, none.

Assessed valuation of property of all kinds, $4,241,138.

The mineral resources of Throckmorton county have not been investigated, although some deep drilling for oil in the northwest part of the county has been carried on during the last year.

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TITUS COUNTY.

Location—Northeast Texas.

County seat—Mount Pleasant; population, 3137; elev. 405; lat. 33° 10′; long. 94° 58′; mag. dec. 7° 51′.

Area, square miles, 421.

Population, 16,422.

Railroads, 3.

Miles of railroad, 48.90.

Assessed valuation of property of all kinds, $4,760,003.

Mineral resources—Clays; iron ore; lignite; sandstone; mineral waters.

The clays and iron ore have not been investigated.

The lignite mined near Cookville has the following composition:

	Per cent.
Moisture	31.24
Volatile combustible matter	40.29
Fixed carbon	21.07
Ash	7.40
	100.00
Sulphur	0.73
B. t. u. per pound	6,727

The composition of Red Mineral Springs water, from Mount Pleasant, is as follows:

	Grains per U. S. Gallon.	
	Spring No. 1.	Spring No. 2.
Sodium oxide	2.42	2.30
Potassium oxide	1.12	0.22
Calcium oxide	2.07	1.28
Magnesium oxide	0.65	0.54
Anhydrous sulphuric acid	1.22	1.22
Humic acid	12.46	11.62
	19.94	17.18

Analyses by H. H. Harrington.

TOM GREEN COUNTY.

Location—West of center; traversed by the Concho river.

County seat—San Angelo; population, 10,321; elev. 1,847; lat. 31° 28′; long. 100° 26′; mag. dec. 9° 35′.

Area, square miles, 1,363.

Population, 17,882.

Railroads, 3.

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Miles of railroad, 98.91.

Assessed valuation of property of all kinds, $10,875,500.

Mineral resources—Clays; limestone; natural gas; petroleum; sandstone; dolomite; gold.

The easily fusible clays are represented by an analysis of a sample from near San Angelo, as follows:

	Per cent.
Silica	58.48
Alumina	18.23
Oxide of iron	7.54
Lime	1.24
Magnesia	3.83
Soda	2.88
Potash	1.15
Titanic acid	1.05
Water	5.46
	99.86
Total fluxes	16.64

This clay burned to a dense, hard body at a temperature of 1,922 degrees F.

There are good limestones and sandstones in this county, but their qualities have not been investigated.

Near Christoval, on the Concho river, south of San Angelo, oil and gas have been found in comparatively shallow wells.

There are localities in the county where drilling operations could be conducted with hope of success. It is stated that some deep wells are to be bored at one or two places of considerable promise.

A sample of gold ore, said to be from near Mertzon, gave a value of $237 per ton. This locality has not been prospected.

A sample of dolomite from Ben Ficklin had the following composition:

	Per cent.
Silica	6.90
Alumina	5.19
Oxide of iron	0.61
Lime	29.69
Magnesia	13.91
Carbonic acid	38.60
Loss on ignition	5.00
	99.90

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The composition of the water from the Morgan Mineral Wells Company, Christoval, is as follows:

	Grains per U. S. Gallon.
Sodium chloride	51.774
Sodium bicarbonate	3.812
Calcium carbonate	3.106
Aluminum sulphate	3.228
Magnesium sulphate	8.090
Silica	0.420
	70.400

Hydrogen sulphide gas, 8.54 cu. in. per gallon.
Analysis by R. H. Needham.

Two samples of mineral water from the Concho Land Company, Carlsbad and San Angelo, had the following composition:

	Grains per U. S. Gallon.	
Silica	3.39	1.03
Oxide of iron and alumina	0.53	0.16
Sodium chloride	192.43	113.75
Potassium chloride	1.17	.....
Magnesium chloride	6.87	.....
Magnesium sulphate	98.55	10.31
Calcium sulphate	74.13	80.23
Calcium bicarbonate	47.38	22.90
	424.45	228.38

Analyses by W. T. Garbade, Medical Department, University of Texas.

TRAVIS COUNTY.

Location—Southeast of center; traversed by the Colorado river.

County seat — Austin; population, 29,860; elev. 466; lat. 30° 16′; long. 97° 46′; mag. dec. 8° 17′.

Area, square miles, 1,036.

Population, 55,620.

Railroads, 3.

Miles of railroad, 87.20.

Assessed valuation of property of all kinds, $38,644,950.

Mineral Resources—Bat guano; clays; limestone; marble; petroleum; sulphate of strontium (celestite); mineral waters; trap rock for road metal; gravel.

The calcareous brick clays are represented by analyses of two samples, both from near Austin, as follows:

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	1	2
Silica	53.60	34.60
Alumina	9.00	15.02
Oxide of iron	2.60	3.02
Lime	16.80	21.48
Magnesia	1.20	0.15
Soda	Trace	1.43
Potash	1.80	1.43
Titanic acid	0.80	0.96
Water	2.72	6.00
Carbonic acid	11.64	15.60
	100.16	99.60
Total fluxes	23.40	27.42
Became viscous at, deg. F.	2,246	2,260

A sample of so-called Caen marble from near Austin had the following composition and qualities:

	Per cent.
Silica	0.90
Alumina	0.06
Oxide of iron	0.14
Lime	53.96
Carbonic acid	42.40
Loss on ignition	1.71
	99.17
Weight of a cubic foot, pounds	156.80
Pounds of water absorbed per cubic foot	3.87
Crushed at, pounds per square inch	8,882

Travis county is particularly rich in heavy deposits of limestone of excellent quality.

Among the earlier investigations of these limestones the tests made by Colonel D. W. Flagler, U. S. A., at the Rock Island Arsenal, Rock Island, Illinois, may be quoted. These tests were made for the Capitol Commission, 1881, and the results were as follows:

	1	2	3
Weight per cubic foot, pounds	162.03	134.76	135.86
Pounds of water absorbed per cu. ft.	None	None	None
Crushed at, pounds per square inch	8,207	3,422	2,279

1. Fossiliferous limestone, Loomis & Christian's quarry. This is the so-called Caen marble.
2. Austin Quarry. Stone used in building the Travis county courthouse.
3. Hancock Quarry, 8 miles from Austin. Probably at or near Spicewood Springs.

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During the last months the Bureau of Economic Geology has made many analyses and tests on limestones from Travis county, the samples weighing from 30 to 40 pounds. Of these, ten are selected as fairly representing the range of composition and qualities, as follows:

	1	2	3	4	5	6	7	8	9	10
Silica	2.30	0.50	0.30	0.40	0.40	2.34	1.30	0.50	0.16	0.70
Alumina	5.82	0.74	0.30	0.80	0.05	2.81	0.50	0.21	0.40	2.30
Ox. iron	1.52	1.82	0.90	1.20	1.35	1.08	0.60	0.75	0.60	0.30
Lime	45.21	52.20	55.10	54.06	54.08	44.96	53.72	51.18	52.50	53.18
Carb. acid	38.10	42.50	43.30	42.48	42.49	39.44	42.44	41.74	41.50	40.40
Loss on ign.	6.50	1.60	0.04	1.92	1.51	3.98	1.06	1.96	2.90	3.40
	99.45	99.36	99.94	100.86	99.88	94.61	99.62	96.34	98.06	100.28
Wt. per cu. ft., lbs.	162	159	165	165	165	156	------	------	------	165
Lbs. water absorbed per cu. ft.	2.76	2.31	1.29	1.56	0.77	4.09	------	------	------	1.23
Crushed at, lbs. per sq. in.	15,365	9,850	14,050	13,750	18,225	12,125	------	------	------	13,875

Explanation:

1. About a mile from Manchaca, on Austin-Manchaca road, and about ¼ mile west of the I. & G. N. Ry. Heavy exposure.
2. Barton Creek, near Austin, about a mile above Barton Spring. Heavy exposure. Contains also 1.01 per cent. of magnesia.
3. Austin White Lime Co., McNeil. Old pit on west side. Near I. & G. N. and A. & N. W. Rys. Good exposure.
4. About 6 miles from Austin, on upper Manchaca road, near Oak Hill switch from I. & G. N. and M., K. & T. Rys. Good exposure.
5. First creek north of Duval section-house, I. & G. N. Ry., at crossing of wagon road and railroad, about 12 miles northwest of Austin. Light exposure.
6. Hamilton place, 8 miles northwest of Austin, on Burnet road, about 500 yards west of the I. & G. N. Ry. Contains also 4.24 per cent. magnesia and 0.50 per cent. of sulphuric acid. Heavy exposure.
7. Old Johnson quarry, Deep Eddy, Colorado river, Austin.
8. Spicewood Springs, 7 miles northwest of Austin and within ½ mile of the I. & G. N. Ry. Contains also 3.54 per cent. of sulphuric acid. Good exposure.
9. Old Taylor quarry at lime kiln, near end of I. & G .N. Ry. track to Austin dam. Good exposure.
10. Old Walsh quarry, near end of I. & G. N. Ry. track to Austin dam. Good exposure. Stone from this quarry used in making concrete for dam.

The Dry Creek quarry stone, a few miles northwest of Austin, has the following composition and qualities:

	Per cent.
Silica	1.07
Alumina	0.22
Oxide of iron	0.71
Lime	52.91

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	Per cent.
Carbonic acid	41.28
Loss on ignition	1.91
	98.10

Weight of a cubic foot, pounds	146.70
Pounds of water absorbed per cu. ft.	5.38
Crushed at, pounds per sq. in.	3,150

The average composition of the white lime made at McNeil by the Austin White Lime Company is as follows, analyses by J. R. Bailey, University of Texas:

	Per cent.
Insoluble siliceous matter	0.20
Oxides of iron and alumina	0.15
Lime	97.65
Magnesia	None
Sulphuric acid	None
Loss at white heat	1.21
	99.21

A heavy, asphaltic oil has been found near Watters Park and between this place and Dessau at depths varying from 300 to 600 feet, but it has not been brought into use.

The deposits of celestite (sulphate of strontium) on Mount Barker and Mount Bonnell, near Austin, have not come into commercial use. This locality gives a celestite of exceptional purity. It occurs as "pockets" of greater or lesser extent in Cretaceous limestone. The trap rock (nephelite basalt) that forms Pilot Knob, 10 miles southeast of Austin and 5 miles from the I. & G. N. and M., K. & T. Rys. is an excellent material for concrete and for road-making. It has a weight of nearly 200 lbs. per cubic foot and a maximum crushing strength of more than 46,000 pounds per square inch. It is practically the same rock that occurs near Knippa, in Uvalde county, on the Southern Pacific Ry., about 80 miles west of San Antonio. At this place there is a modern crusher plant of a capacity of 750 tons a day and a considerable amount of the crushed and sized material has been used in San Antonio. The deposits in Travis county are the only ones known to exist within easy reach of shipping facilities in all of central and north central Texas. This and the Knippa stone are the best road-making materials known to occur in Texas.

A deposit of this stone is also found in Travis Heights, South Austin, within a mile of the I. & G. N. Ry., the M., K. & T. Ry.

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and the H. & T. C. Ry. It is of unknown extent, but steps are being taken to investigate the locality thoroughly.

The composition of the mineral water from the well at the Capitol, depth 1,511 feet, is as follows:

	Grains per U. S. Gallon.
Socium chloride	42.945
Sodium sulphate	52.360
Magnesium sulphate	14.140
Calcium sulphate	3.752
Calcium carbonate	10.745
Potash	Trace
Silica	0.805
Alumina, Oxide of iron	Trace
	124.747

Analysis by L. Magnenat.

The total depth of this well was 1,554 feet and the flow was 86,400 gallons per 24 hours.

Composition of the Champion Mineral Water, near junction of the small branch with main channel of Bull creek:

Hypothetical combination—	Grains per U. S. Gal.
Potassium chloride	Trace
Sodium chloride	55.343
Sodium sulphate	153.376
Magnesium sulphate	91.098
Calcium sulphate	7.330
Calcium bicarbonate	78.390
Iron bicarbonate	0.099
Alumina	0.303
Silica	0.320
	386.259
Free carbonic acid, cu. inches per gal.	1,7088

Analysis by H. W. Harper, University of Texas.

TRINITY COUNTY.

Location—East Texas; southwest of the Neches river.

County seat—Groveton; population, 1,076; elev. 323; lat. 31° 4′; long. 95° 7′; mag. dec. 8° 0′ (1911).

Area, square miles, 704.

Population, 12,768.

Railroads, 6.

Miles of railroad, 102.32.

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Assessed valuation of property of all kinds, $6,594,911.

Mineral resources—Clays; lignite; natural gas; sandstone; gravel.

The clays have not been investigated. There is a good deal of lignite in the county, but no producing mines. At Hyde's Bluff, on the Trinity river, there is an outcrop of lignite 4 feet thick, which has the following composition:

	Per cent.
Moisture	13.10
Volatile combustible matter	41.65
Fixed carbon	36.80
Ash	8.45
	100.00
Sulphur	0.90

At Westmoreland Bluff is another lignite outcrop. A sample of natural gas taken from a spring a mile east of Trinity gave, on analysis, 929 B. t. u. per cubic foot, an excellent result.

TYLER COUNTY.

Location—Southeast Texas; west of the Neches river.

County seat—Woodville; population, 650; elev. 232; lat. 30° 46′; long. 94° 22′; mag. dec. 7° 46′ (1912).

Area, square miles, 925.

Population, 10,250.

Railroads, 4.

Miles of railroad, 56.27.

Assessed valuation of property of all kinds, $5,269,551.

Mineral resources—Asphalt rock; clays; sandstone; gravel.

The asphalt rock is a bituminous sandstone similar to rock in Jasper county.

The sandy brick clays of this county are represented by an analysis of a sample from Colmesneil, as follows:

	Per cent.
Silica	90.00
Alumina	4.60
Oxide of iron	1.44
Lime	0.10
Magnesia	0.10
Soda	Trace
Potash	Trace
Titanic acid	0.70
Water	3.04
	99.98
Total fluxes	1.64

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This clay did not fuse at a temperature of 2,570 deg. F., but melted to a glass at 3,038 deg. F.

We have received many samples of sandstone from D. M. Picton & Co., Beaumont, representing the quarries at Rockland. Of these ten are selected as showing the different kinds of material, as follows:

	1	2	3	4	5	6	7	8	9	10
Silica	82.30	84.20	81.00	80.30	84.75	88.60	87.40	88.60	86.40	85.94
Alumina	8.21	5.42	10.58	7.87	6.80	4.42	5.43	5.06	6.81	6.12
Ox. iron	2.83	4.08	1.10	2.83	2.20	2.20	2.67	1.26	1.89	2.20
Lime	tr.	------	------	------	------	0.33	------	------	------	------
Magnesia	0.33	0.31	0.42	0.87	0.62	0.54	0.22	0.11	0.25	0.56
Carb. acid	0.30	------	------	------	0.24	0.86	0.66	------	------	------
Sulph. acid	0.23	0.37	------	1.51	0.85	------	------	0.42	------	------
Loss on ign.	5.42	5.80	7.16	6.62	5.46	3.04	3.44	5.00	4.60	5.40
	99.62	100.18	100.26	100.00	100.91	99.49	99.82	100.45	99.96	100.22
Wt. per cu. ft., lbs.	138.6	132.9	117.9	131.3	143.4	141.5	124.3	129.4	137.7	135.2
Lbs. water absorbed per cu. ft.	3.68	6.24	11.94	5.54	0.77	4.34	11.82	8.69	5.24	0.29
Crushed at, lbs. per sq. in.	6,815	4,750	2,125	3,950	4,875	7,250	2,800	3,725	5,550	5,000

The Rockland sandstone is principally used for rip-rap.

UPSHUR COUNTY.

Location—Northeast Texas.

County seat—Gilmer; population, 1,484; elev. 370; lat. 32° 43′; long. 94° 56′; mag. dec. 7° 59′ (1911).

Area, square miles, 527.

Population, 19,960.

Railroads, 4.

Miles of railroad, 86.

Assessed valuation of property of all kinds, $6,067,700.

Mineral resources—Clays; iron ore; lignite.

The clays have not been investigated.

Brown iron ore (limonite) occurs in the northeast part of the county; near Coffeeville, three miles south and three miles southeast; near Gilmer, near Omega Postoffice, etc. The total iron ore area within the county is thought to be about ten square miles, but it is not known how much of this would be ore-bearing in a commercial sense. The ores are of medium quality, so far as present information goes, although an ore of 56 per cent of iron occurs three miles southeast of Coffeeville and a 50 per cent ore is found three miles southwest of this place. Two analyses of the lignite from near Gilmer are as follows:

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	1	2
Moisture	11.40	25.20
Volatile combustible matter	42.80	37.50
Fixed carbon	33.76	26.09
Ash	12.04	11.21
	100.00	100.00
Sulphur	0.88	1.20
B. t. u.	.....	7,650

UPTON COUNTY.

Location—West Texas.

County seat—Upland; population, 35.

Area, square miles, 1,190.

Population, 501.

Railroads, 1.

Miles of railroad, 36.

Assessed valuation of property of all kinds, $2,672,975.

Mineral resources—Unknown.

UVALDE COUNTY.

Location—Southwest Texas.

County seat—Uvalde; population, 3,998; elev. 937; lat. 29° 13′; long. 99° 48′; mag. dec. 9° 48′.

Area, square miles, 1,759.

Population, 11,223.

Railroads, 2.

Miles of railroad, 51.64.

Assessed valuation of property of all kinds, $9,008,809.

Mineral resources—Asphalt rock; bat guano; coal; lignite; limestone; trap rock for road; metal.

The asphalt rock is of two distinct kinds, bituminous limestone and bituminous sandstone.

The chief deposit of bituminous limestone occurs at Carbonville, six miles south of Cline, a station on the Southern Pacific Railway, with which it is connected by a spur track.

The plant at this place was originaly designed for the extraction of bitumen with naphtha. In 1895 there were shipped 450 tons of "litho-carbon," the selling price being $50.00 a ton. New York. Two classes of product seem to have been made, hard gum (mastic) and soft gum. These substances do not seem to have been produced separately after January, 1895, but dur-

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ing two months in 1894 and one month in 1895, the total production was 1,922,984 pounds, or 511 tons of 2,000 pounds.

The extraction with naphtha seems to have been suspended in January, 1895, and was not resumed until 1899. In this year, the production of gum was 1,647,696 pounds, or 823.8 tons. During the three months of 1900, when the plant was running, the production of gum was 516,136 pounds, or 258 tons. The total amount of gum produced was about 2,043 tons. For several years no attempt has been made to extract the bitumen, the work being confined to mining the rock and shipping it for paving purposes. It has been used in San Antonio, Waco, etc., and some shipments were made to Toledo, Ohio, and to Shreveport, Louisiana. When properly prepared and laid on a foundation suitable for this kind of material, there seems to be no reason why this rock should not make excellent pavements.

The average of many analyses of this rock shows that it contains from 14 to 17 per cent of total bitumen, with 80 to 85 per cent. of carbonate of lime, a small amount of silica, alumina and oxide of iron, with sulphur up to 1 per cent. The asphaltene varies from 50 to 75 per cent. of the total bitumen.

Six miles south of Carbonville, on the Smyth-Nunn ranch, there is another heavy deposit of bituminous limestone of the following composition:

	Per cent.
Asphaltene	6.73
Petrolene	9.28
Carbonate of lime	78.73
Silica	5.26
Sulphur	1.50
Total bitumen	16.01

At Waxy Falls, on the Nueces river, about twelve miles west of south from Uvalde, there is a calciferous bituminous sandstone on W. P. May's ranch, of the following composition:

	Per cent.
Asphaltene	4.19
Petrolene	5.28
Carbonate of lime	11.24
Silica	79.27
Sulphur	0.91
Total bitumen	9.47

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Other analyses of this stone show total bitumen 14 per cent. The silica varies from 74 to 82 per cent. and the carbonate of lime from 7 to 14 per cent. This bituminous sandstone has also been used for street pavements.

The active competition of bitulithic and other forms of artificial asphalt pavements, of paving brick, etc., have interfered with the development of the Uvalde county natural asphalt rocks. A large business might have been built up had the same care in the preparation and laying of this material been shown as has been the case with competing materials. This is particularly true of the foundations on which the paving proper is laid, for without such adequate sub-courses no paving can be expected to give the best service.

The outcrops of sub-bituminous coal along the Nueces river have not been prospected, and but little is known concerning the quality or extent of the beds.

The deposit of trap rock (nephelite basalt) near Knippa constitutes the best road-making material known to exist in Texas. A modern crushing plant of a capacity of 750 tons a day has been built, and considerable shipments have been made to San Antonio, etc., for concrete. This stone has a weight of nearly 200 lbs. per cubic foot, and a crushing strength of more than 30,000 lbs. per square inch. The Pilot Knob trap, Travis county, is a similar stone. The results of further examinations of these rocks will appear in the Bulletin on Road Making Materials now in preparation, by the Bureau of Economic Geology.

The existence of kaolin in Uvalde county has been reported, but we have no positive information concerning it.

VAL VERDE COUNTY.

Location—Southwest Texas.

County seat — Del Rio; population, 4,000; elev. 948; lat. 29° 22′; long. 100° 52′; mag. dec. 9° 58′.

Area, square miles, 3,034.

Population, 8,613.

Railroads, 1.

Miles of railroad, 124.58.

Assessed valuation of property of all kinds, $8,905,516.

Mineral resources—Limestone.

The mineral resources have not been investigated.

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VAN ZANDT COUNTY.

Location—Northeast Texas.

County seat—Canton; population, 600; lat. 32° 33′; long. 95° 52′; mag. dec. 8° 21′ (1912).

Area, square miles, 877.

Population, 25,651.

Railroads, 2.

Miles of railroad, 32.69.

Assessed valuation of property of all kinds, $9,541,435.

Mineral resources—Clays; iron ore; lignite; salt.

The clays have not been investigated.

Lignite occurs in many parts of the county, as at Grand Saline, along the Sabine river, at Wills Point, etc. The composition of the lignite mined at Wills Point is as follows:

	Per cent.
Moisture	27.20
Volatile combustible matter	40.90
Fixed carbon	27.00
Ash	4.81
	100.00
Sulphur	0.48
B. t. u. per pound	7,682

There is a small area of brown iron ore (limonite) in the southeastern part of the county, but the quality is not good. The total area is probably about one square mile.

This county has been for some years an important producer of salt, obtained from brine. The industry centers around Grand Saline, and extensive improvements have recently been made, especially by B. W. Carrington & Co., in the process of manufacture. At this plant the pan house contains three triple-effect vacuum evaporating pans; the brine is taken from the wells to the settlers, thence to these pans, then the water evaporated in vacuum and the salt delivered by elevators from the bottom of these pans to storage bins in the top of the same building. In these bins the salt is drained and is then distributed to a belt conveyor which carries it to the store-house. From this store-house, the cured salt is taken to the dairy or table salt mill, where it is kiln-dried in a rotary direct heat coke drier. It then goes to a

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system of screens in the top of the building, where it is prepared into the various grades to meet demand.

The advantage of the vacuum system of evaporation over the old open grainer method, is said to be, first, great economy in fuel; and, second, the production of a uniform cube crystal salt in place of the irrregular flaky grade produced by the grainers.

The Carrington plant is designed for a production of a little over 1,100 barrels daily.

VICTORIA COUNTY.

Location—Southeast Texas.

County seat — Victoria; population, 3,673; elev. 93; lat. 28° 48′; long. 97° 0′; mag, dec. 8° 59′.

Area, square miles, 883.

Population, 14,990

Railroads, 2.

Miles of railroad, 90.

Assessed valuation of property of all kinds, $13,529,180.

Mineral resources—Clays.

The mineral resources have not been investigated.

WALKER COUNTY.

Location—East Texas.

County seat—Huntsville; population, 2,073; elev. 400; lat. 30° 42′ long. 95° 32′; mag. dec. 8° 16′ (1912).

Area, square miles, 754.

Population, 16,061.

Railroads, 3.

Miles of railroad, 54.75.

Assessed valuation of property of all kinds, $5,831,925.

Mineral resources—Clays; fuller's earth, lignite; natural gas; petroleum; sandstone; gravel.

The clays (including fuller's earth) have not been investigated. Lignite is known to occur, but has not been developed. An analysis of a small sample of lignite from a locality south of the Trinity river and about twelve miles north of Huntsville was as follows:

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	Per cent.
Moisture	13.73
Volatile combustible matter	45.95
Fixed carbon	37.22
Ash	3.10
	100.00

This seam is said to be from 10 to 12 feet thick, but no attempt has been made to mine it.

Natural asphalt has been found in the same locality, but nothing is known concerning the extent, etc.

West of the lignite area there is a heavy outcrop of a sandstone that would make excellent material for rip-rap, railroad ballast, etc., but it has not been developed. Petroleum and natural gas have been found in deep drilling, both north and west of Huntsville, but no commercial fields have been opened.

WALLER COUNTY.

Location—Southeast Texas.

County seat—Hempstead; population, 1,848; elev. 251; lat. 30° 8′; long. 96° 10′; mag. dec. 7° 57′

Area, square miles, 510.

Population, 12,138.

Railroads, 3.

Miles of railroad, 40.53.

Assessed valuation of property of all kinds, $5,364,278.

Mineral resources—Clays; gravel.

The mineral resources have not been investigated.

WARD COUNTY.

Location—West Texas; southeast of New Mexico.

County seat—Barstow; population, 500; elev. 2,557.

Area, square miles, 858.

Population, 2,389.

Railroads, 1.

Miles of railroad, 43.50.

Assessed valuation of property of all kinds, $4,462,366.

Mineral resources—Salt; sandstone.

Salt occurs in Ward county as encrustations, etc., in old lake basins and depressions. It is used locally.

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The red sandstone, near Barstow, has been used to a considerable extent. The work here was suspended several years ago, but the demand for this stone in the addition to the Bexar county courthouse has caused a resumption of work temporarily. The composition and qualities of this red sandstone are as follows:

	Per cent.
Silica	70.00
Alumina	7.50
Oxide of iron	3.00
Lime	8.00
Magnesia	0.30
Soda	2.00
Potash	2.50
Carbonic acid	6.00
Water	0.40
	99.70

Weight of a cubic foot, pounds	156.00
Pounds of water absorbed per cubic foot	11.50
Crushed at, pounds per sq. inch	2,000

WASHINGTON COUNTY.

Location—Southeast Texas.

County seat — Brenham; population, 4,718; elev. 332; lat. 30° 10′; long. 96° 23′; mag. dec. 8° 57′ (1912).

Area, square miles, 568.

Population, 25,561.

Railroads, 3.

Miles of railroad, 87.34.

Assessed valuation of property of all kinds, $11,072,190.

Mineral resources—Clays; natural gas; opalized wood, fuller's earth; gravel.

The clays have not been investigated.

The quality of the brick made in the county is shown by the following results of the examination of a sample from the Brenham Pressed Brick Company, several years old:

Weight per cubic foot, pounds	101.10
Per cent. of cells by volume	37.37
Volume of cells in 100 parts by weight	23.08
Pounds of water absorbed per cu. ft.	23.33
Crushed at, pounds per square inch	3,358

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Fuller's earth of good quality occurs at and near Burton, but it has not been developed. Of two samples examined by J. C. Blake, one gave a bleaching power on refined cotton seed oil of 64, and the other of 168, English earth being taken as 100.

More than thirty years ago natural gas under good pressure was found in a well drilled near Burton, but records are not now available.

WEBB COUNTY.

Location—South Texas.

County seat — Laredo; population, 14,855; elev. 438; lat. 27° 32′; long. 99° 31′; mag. dec. 8° 50′.

Area, square miles, 3,421.

Population, 22,503.

Railroads, 3.

Miles of railroad, 124.94.

Assessed valuation of property of all kinds, $7,980,413.

Mineral resources — Clays; coal; natural gas; sandstone; gravel.

The buff-burning semi-refractory clays are represented by the following average of four samples from Minera and Cannel, shaly clays from below the coal:

	Per cent.
Silica	60.41
Alumina	22.43
Oxide of iron	1.90
Lime	0.44
Magnesia	0.61
Soda	0.24
Potash	0.45
Titanic acid	1.30
Water	6.00
Organic matter	6.50
	100.28
Total fluxes	3.64

These clays will vitrify at a temperature of about 2,400 degrees F., and will become viscous below 3,000 degrees F.

The calcareous brick clays are represented by an analysis of a sample from Laredo, as follows:

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	Per cent.
Silica	59.03
Alumina	11.19
Oxide of iron	2.77
Lime	12.16
Magnesia	0.80
Soda	0.18
Potash	Trace
Titanic acid	1.05
Carbonic acid	9.60
Water	2.10
	98.88
Total fluxes	15.91

This clay became viscous at a temperature of 2,318 degrees F.

The quality of the brick made in Webb county is shown by the following results of tests:

	1	2	3	4	5
Weight per cu. ft., pounds.	95.8	97.85	93.60	110.10	96.29
Per cent. of cells by volume	41.79	40.76	43.90	32.76	42.04
Volume of cells in 100 parts by weight	27.22	26.00	29.27	18.57	27.26
Pounds of water absorbed per cu. ft.	26.07	25.44	27.39	20.44	26.24
Crushed at, pounds per sq. inch	1,442	1,776	1,027	1,263	1,007

1. No. 1 yellow, Geo. R. Page & Co., Laredo.
2. No. 2 eye-brick, Geo. R. Page & Co., Laredo.
3. No. 3 white brick, Geo. R. Page & Co., Laredo.
4. Face brick, Reiser Pressed Brick Co., Laredo.
5. Derby Brick Manufacturing Co., Laredo.

For a number of years Webb county has been an important producer of sub-bituminous coal. The mines are at Darwin, Cannel, Minera, etc., along the R. G. & E. P. Ry., running up the Rio Grande from Laredo. The composition of this coal is given by the following average of 13 analyses:

	Per cent.
Moisture	2.96
Volatile combustible matter	47.42
Fixed carbon	35.69
Ash	13.93
	100.00
Sulphur	2.32
B. t. u. per pound	11,863

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The town of Laredo is supplied with natural gas by the Border Gas Company from wells at Reiser, 18 miles east of Laredo. The average B. t. u. per cubic foot of this gas is 746, although one sample ran as high as 948.

WHARTON COUNTY.

Location—Southeast Texas.

County seat — Wharton; population, 1,505; elev. 111; lat. 29° 18′; long. 96° 4′; mag. dec. 8° 18′.

Area, square miles, 1,137.

Population, 21,123.

Railroads, 4.

Miles of railroad, 106.42.

Assessed valuation of property of all kinds, $15,869,939.

Mineral resources—Clays; gravel.

The calcareous brick clays are represented by the following average of three samples from near Wharton:

	Per cent.
Silica	64.85
Alumina	9.30
Oxide of iron	3.02
Lime	9.26
Magnesia	0.49
Soda	0.89
Potash	0.17
Titanic acid	0.97
Water	3.51
Carbonic acid	7.31
	99.77
Total fluxes	13.86

These clays become viscous at a temperature of 2,100 degrees F.

WHEELER COUNTY.

Location—East line of Panhandle.

County seat—Wheeler; population, 200.

Area, square miles, 851.

Population, 5,258.

Railroads, 1.

Miles of railroad, 33.38.

Assessed valuation of property of all kinds, $3,811,538.

Mineral resources—Unknown.

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WICHITA COUNTY.

Location—North Texas; borders on the Red river.

County seat—Wichita Falls; population, 8,200; elev. 946.

Area, square miles, 606.

Population, 16,094.

Railroads, 6.

Miles of railroad, 71.88.

Assessed valuation of property of all kinds, $18,507,195.

Mineral resources — Clays; copper ores; limestone; natural gas; petroleum; sandstone; gravel.

The clays have not been fully investigated, but a large brick and tile plant at Wichita Falls utilizes the deposits near that city.

The copper ores are Permian and have not been utilized. They occur as chalcocite and as replacements after wood (malachite, etc.)

Wichita is one of the important oil producing counties. The Electra field came into production in 1911, and to the close of 1913 yielded 11,964,627 barrels valued at about $10,169,000.

The geology of the Wichita county oil fields has been investigated by J. A. Udden, geologist for the Bureau of Economic Geology, and his report was issued in 1912 as Bulletin No. 246, "The Oil and Gas Fields of Wichita and Clay Counties." It may be obtained on application to the Bureau.

WILBARGER COUNTY.

Location—North Texas; borders on Red river.

County seat — Vernon; population, 3,195; elev. 1,205; lat. 34° 9′; long. 99° 18′; mag. dec. 9° 52′.

Area, square miles, 923.

Population, 12,000.

Railroads, 3.

Miles of railroad, 58.90.

Assessed valuation of property of all kinds, $11,466,140.

Mineral resources—Clays; copper ores; possibly natural gas and petroleum.

The clays have not been investigated.

The copper ores are Permian and have not been utilized. It is possible that the Wichita county oil fields extend into this county.

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WILLACY COUNTY.

Location—Extreme southern part; borders on Baffin Bay.
County seat—Sarito; population, ...; elev. 38.
Area, square miles, ...
Population, (organized after 1910).
Railroads, 1.
Miles of railroad, 47.60.
Assessed valuation of property of all kinds, $2,162,307.
Mineral resources—Clays; salt, in old salt lakes.
The mineral resources have not been investigated.

WILLIAMSON COUNTY.

Location—Near center, southeast.
County seat—Georgetown; population, 3,096; elev. 442; lat. 30° 39′; long. 97° 40′; mag. dec. 8° 33′.
Area, square miles, 1,169.
Population, 42,228.
Railroads, 4.
Miles of railroad, 146.88.
Assessed valuation of property of all kinds, $32,344.520.
Mineral resources—Bat guano; clays; gold; limestone; dolomite; petroleum; mineral waters; gravel.
The calcareous brick clays are represented by an analysis of a sample from near Taylor, as follows:

	Per cent.
Silica	21.72
Alumina	7.97
Oxide of iron	2.23
Lime	36.54
Magnesia	0.95
Soda	Trace
Potash	Trace
Titanic acid	0.52
Water	2.06
Carbonic acid	28.44
	99.73
Total fluxes	39.72

This clay became vitrified below 2,390 degrees F.
The quality of the brick made is shown by the following tests on a sample from the Taylor Brick Company, several years old:

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Weight per cubic foot, pounds	110.90
Per cent. of cells by volume	32.98
Volume of cells in 100 parts by weight	18.57
Pounds of water absorbed per cubic foot	20.59
Crushed at, pounds per square inch	3,656

In 1883 gold ore was discovered in limestones twenty miles north of Georgetown. Some of the samples carried as much as $2,500 a ton in gold, but a careful examination of the locality failed to show commercial possibilities. The gold was carried in a decomposed limestone heavily stained with oxide of iron, which was probably derived from pyrite, by oxidation. An analogous occurrence is in Tom Green county, near Mertzon, where a similar material carried $237 a ton in gold.

Williamson county contains many varieties of limestone suitable for building and road purposes, for the manufacture of white lime, etc.

From a considerable number of analyses and tests we select five as typical. These are as follows:

	1	2	3	4	5
Silica	1.00	0.39	1.40	5.96	0.96
Alumina	1.30	0.31	0.36	2.00	None
Oxide of iron	Trace	Trace	Trace	0.82	4.80
Lime	55.00	55.06	54.80	41.66	50.20
Magnesia	Trace	0.11	0.48	7.51	None
Carbonic acid	42.90	42.94	41.90	41.30	38.73
Loss on ignition	.....	.....	1.76	1.24	4.67
	100.20	98.81	100.76	100.49	99.06
Weight of a cu. ft., lbs.	144.70	132.30	107.30	146.00	153.00
Lbs. of water absorbed per cu. ft.	17.70	15.50	14.26	6.89	5.04
Crushed at, lbs. per sq. inch	1,495	2,808	2,155	7,000	9,050

Explanation:

1. Round Rock.
2. Cedar Park. E. Cluck & Bro.
3. Leander. R. B. George & Co.
4. Near Cedar Park. J. R. King.
5. Brushy Creek, 1½ miles N. of Round Rock.

Some of the Williamson county limestones show much higher crushing strengths than any of the preceding. Thus, a sample from a heavy exposure about one and one-half miles east of Round Rock, on Lake Brushy Creek, and some 300 yards from the main line of the I. & G. N. Ry. crushed at 11,550 pounds

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per square inch; another sample from Lake Brushy Creek, about 200 yards above the I. & G. N. Ry. bridge, crushed at 13,725 pounds per square inch; a sample from about one and one-fourth miles south of Round Rock, near the I. & G. N. Ry. and the McNeill wagon road, crushed at 15,050 pounds per square inch, and a sample from the George Johns ranch, about three miles southwest of Round Rock and near the I. & G. N. Ry. main line, crushed at 17,050 pounds per square inch.

Excellent white lime is made at Round Rock by the Round Rock White Lime Company, and a crusher is also operated.

The composition of the Hydrated Premium white lime made at Round Rock by the Round Rock White Lime Company is as follows (analysis by the Underwriters' Laboratory, Chicago):

	Per cent.
Insoluble siliceous matter	0.73
Oxides of iron and aluminum	0.64
Lime (hydrated)	99.30
Magnesia	Trace
Sulphuric acid	Trace
Undetermined	0.13
	100.00

This corresponds very closely with an analysis made December 15, 1903, in the laboratory of the University Mineral Survey by O. H. Palm, which was as follows:

	Per cent.
Insoluble siliceous matter	0.40
Alumina	Trace
Oxide of iron	Trace
Lime (hydrated)	99.05
Magnesia	0.21
Sulphuric acid	Trace
	99.66

Williamson county also has good dolomites, suitable for use in iron furnaces making pig iron for basic steel. The following analysis shows the quality of this stone, from D. MacRae, Cedar Park:

	Per cent.
Silica	0.62
Alumina	0.74
Oxide of iron	Trace
Lime	33.00

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	Per cent.
Magnesia	18.56
Carbonic acid	46.66
	99.58

Weight per cubic foot, pounds	129.20
Pounds of water absorbed per cubic foot	21.42
Crushed at, pounds per square inch	2,644

A similar stone occurs on the property of J. R. King, in the same vicinity.

The discovery of a high grade oil a few miles south of Thrall has attracted much attention of late (1915). This field is unique among the oil fields of the United States in that the oil-sand is an altered igneous rock akin to serpentine. The depth below the surface, at which this material is found, varies from 820 feet, or thereabout, to 900 feet. The maximum thickness is at present unknown but is certainly more than 100 feet, in places. This altered igneous rock is in the Taylor Marls (Upper Cretaceous) above the Austin chalk. It does not appear probable that it was the original repository of the oil. It has afforded to the oil (and gas) a more or less spongy bed, suitable for the entrance and for the retaining of oil and gas.

A notable feature of this material is the occurrence of a comparatively large amount of black, magnetic iron sand.

In the Matanzas province, Cuba, a heavy asphaltic oil has been noticed in conjunction with serpentine, but so far as is now known the Thrall field is the only one in which any considerable quantity of a high grade oil has been found in an altered igneous rock.

The discovery of this fact is due to Dr. J A. Udden, geologist for this Bureau, and he published an article on the subject in the Oil and Gas Journal, Tulsa, Oklahoma, April 22, 1915, p. 27.

WILSON COUNTY.

Location—South Texas.

County seat — Floresville; population, 1,398; elev. 389; lat. 29° 7′; long. 98° 10′; mag. dec. 9° 3′ (1912).

Area, square miles, 784.

Population, 17,066.

Railroads, 2.

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Miles of railroad, 54.16.

Assessed valuation of property of all kinds, $10,254,470.

Mineral resources—Clays; lignite; mineral waters; gravel.

Wilson is one of the most important clay-working counties in the State. The pottery clays of the county are represented by an analysis of a sample from Lavernia, as follows:

	Per cent.
Silica	68.84
Alumina	21.15
Oxide of iron	1.15
Lime	Trace
Magnesia	Trace
Soda	1.12
Potash	0.45
Titanic acid	1.22
Water	6.62
	100.55
Total fluxes	2.72

This clay became viscous at a temperature of 3,038 degrees F.

The buff-burning semi-refractory clays are represented by an analysis of a sample from Calaveras, as follows:

	Per cent.
Silica	70.50
Alumina	18.30
Oxide of iron	1.80
Lime	Trace
Magnesia	0.90
Soda	0.20
Potash	Trace
Titanic acid	1.20
Water	5.50
	98.40
Total fluxes	2.90

This clay became viscous at a temperature of 2,498 degrees F.

The calcareous brick clays are represented by an analysis of a sample from Calaveras, as follows:

	Per cent.
Silica	37.45
Alumina	7.72
Oxide of iron	2.02
Lime	27.92
Magnesia	0.36

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	Per cent.
Water	2.40
Carbonic acid	21.80
	99.67
Total fluxes	30.30

This clay slagged at a temperature of 2,390 degrees F.

The quality of the brick made is shown by the following tests on a sample several years old:

Weight per cubic foot, lbs.	92.87
Per cent. of cells by volume	50.26
Volume of cells in 100 parts by weight	36.20
Pounds of water absorbed per cubic foot	33.61
Crushed at, pounds per square inch	2,144

Lignite occurs in the vicinity of Sutherland Springs, but it has not been developed.

WINKLER COUNTY.

Location—West Texas; southeast of New Mexico.

County seat—Kermit; population, ...

Area, square miles, 888.

Population, 442.

Railroads, 1.

Miles of railroad, 10.

Assessed valuation of property of all kinds, $1,085,473.

Mineral resources—Salt, from old salt lakes, basins, etc.

WISE COUNTY.

Location—North Texas.

County seat — Decatur; population, 1,651; elev. 1,058; lat. 33° 15′; long. 97° 33′; mag. dec. 9° 29′ (1910).

Area, square miles, 843.

Population, 26,450.

Railroads, 2.

Miles of railroad, 96.47.

Assessed valuation of property of all kinds, $14,010,450.

Mineral resources—Clays; coal; limestone; sandstone; gravel.

The red- and brown-burning clays are represented by an analysis of a sample from near Bridgeport, as follows:

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	Per cent.
Silica	56.01
Alumina	24.07
Oxide of iron	2.59
Lime	Trace
Magnesia	1.11
Soda	1.44
Potash	1.19
Titanic acid	1.65
Organic matter	4.04
Water	7.30
	99.40
Total fluxes	6.33

The clays of easy fusibility are represented by an analysis of a sample from Bridgeport, as follows:

	Per cent.
Silica	59.20
Alumina	20.60
Oxide of iron	6.90
Lime	1.08
Magnesia	1.62
Soda	1.84
Potash	1.60
Titanic acid	1.50
Organic matter	0.20
Water	4.66
	99.20
Total fluxes	13.04

This clay became steel hard at a temperature of 1,992 degrees F.

The quality of the brick made is shown by the following tests on samples from the Wise County Brick Company, Bridgeport:

	Dry press.	Stiff mud.	Perforated.
Weight per cu. ft., lbs.	130.70	115.10	106.80
Per cent. of cells by volume	15.09	18.21	16.62
Vol. of cells in 100 parts of weight	7.21	9.87	9.73
Lbs. water absorbed per cu. ft.	9.42	11.36	10.39
Crushed at, lbs. per square inch	6,998	2,800	2,642

Wise county has been an important coal-producing county for some years. The composition of the coal is shown by the following average of 6 analyses:

	Per cent.
Moisture	9.81
Volatile combustible matter	33.06

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	Per cent.
Fixed carbon	44.66
Ash	12.47
	100.00
Sulphur	2.03
B. t. u. per lb.	10,396

Some of the best limestones in the State are found in this county. From a number of analyses and tests we select the following as typical:

	1	2	3	4	5	6
Silica	1.21	1.60	1.76	5.20	1.32	2.20
Alumina	5.45	Trace	1.03	1.02	1.06	0.50
Oxide of iron	1.47	2.49	0.57	Trace	Trace	1.10
Lime	47.75	53.14	50.60	51.78	55.50	53.70
Carbonic acid	36.05	40.76	39.75	41.50	41.14	41.80
Loss on ignition	6.96	2.04	5.65	.....	.....	.....
	99.06	100.03	99.36	99.50	99.02	99.30
Weight per cu. ft., lbs.	168.00	166.40	168.60	170.30	169.70	170.00
Lbs. water absorbed per cu. ft.	0.36	0.73	0.10	.....	.....	.....
Crushed at, lbs. per inch	.....	4,125	4,240	13,644	16,933	14,000

Explanation:

Nos. 1, 2 and 3. Chico Crushed Stone Co., Chico.
Nos. 4, 5 and 6. Bridgeport Coal Co., Bridgeport.

A sample of limestone from Alvord quarry, near Alvord, gave the following results:

	Per cent.
Silica	1.50
Alumina	0.36
Oxide of iron	0.44
Lime	52.87
Magnesia	None
Carbonic acid	41.23
Loss on ignition	2.17
Sulphuric acid	0.55
	99.12
Weight per cubic foot, pounds	168.00
Pounds of water absorbed per cu. ft.	0.31
Crushed at, pounds per square inch	11,425

WOOD COUNTY.

Location—Northeast Texas.

County seat — Quitman; population, 475; elev. 590; lat. 32° 46′; long. 95° 26′; mag. dec. 8° 9′ (1912).

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Area, square miles, 688.

Population, 23,417.

Railroads, 5.

Miles of railroad, 69.72.

Assessed valuation of property of all kinds, $8,720,246.

Mineral resources—Clays; iron ore; lignite; petroleum; glass-sand; gravel.

The pottery clays are represented by the average of two samples from near Cornersville, and two samples from Winsboro as follows:

	Per cent.	
	Cornersville.	Winsboro.
Silica	71.78	67.65
Alumina	16.75	20.50
Oxide of iron	1.11	1.20
Lime	0.32	Trace
Magnesia	1.17	0.25
Soda	0.86	0.50
Potash	0.19	1.05
Titanic acid	1.15	1.30
Water	5.90	6.60
	99.23	99.05
Total fluxes	3.66	3.00

The Cornersville clays burn steel hard at about 2,200 degrees F. and become viscous at temperatures ranging from 2,570 to 3,146 degrees F. The Winsboro clays become steel hard at a temperature of about 2,000 degrees F.

The iron ore beds in Wood county are east of Mineola and north of the Texas & Pacific Railway. They have not been developed or even prospected. Nothing definite is known concerning their extent or quality, but surface specimens indicate a limonite of fairly good character. It is probable that many of the deposits of iron-gravel would make excellent roads, especially the material found along the road from Mineola to Hainesville and west of Mineola on the west side of the Sabine river. In many of the east and northeast counties there are very large deposits of such gravel, containing not enough iron to render them useful as iron ores, but constituting an excellent road material, easily obtained and convenient to some of the principal roads. One of the few localities in Texas where oil can be seen oozing from the ground is southeast of Mineola on the Macklin farm, and south of

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Hainesville, at Seed Tick Spring. It is not unreasonable to think that in this part of the county some producing wells may be brought in, although it must be said that surface indications are not to be depended on with certainty.

Wood county has long been known as one of the most important producers of lignite. The largest lignite mine in the United States, that of the Consumers Lignite Company, is at Hoyt, near Alba, while the Alba-Malakoff Company, at Alba, adds to the already large production of the county. Very nearly one-half of the entire lignite output in the State is from this county.

The composition of the lignite is given by the following average of 20 analyses:

	Per cent.
Moisture	27.05
Volatile combustible matter	35.10
Fixed carbon	29.25
Ash	8.60
	100.00
Sulphur	0.76
B. t. u.	7,469

The composition of the water from the 1,400-foot well at Mineola is as follows:

	Grains per U. S. Gallon.
Silica	2.00
Iron	None
Aluminum	None
Calcium	0.60
Magnesium	0.70
Sodium	30.70
Potassium	2.50
Carbonate radicle (CO_3)	2.40
Bicarbonate radicle (HCO_3)	36.80
Sulphate radicle (SO_4)	0.70
Nitrate radicle (NO_3)	None
Chloride	23.60
	100.50

Analysis said to be by United States Geological Survey.

YOAKUM COUNTY.

Location—West Texas; borders on New Mexico.
County seat—Plains; population, 125; elev. 3,300.

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Area, square miles, 840.
Population, 602.
Railroads, none.
Assessed valuation of property of all kinds, $1,412,232.
Mineral resources—Unknown.

YOUNG COUNTY:

Location—Northwest of center.
County seat—Graham; population, 1,569; elev. 1,045; lat. 33° 4′; long. 98° 35′; mag. dec. 9° 20′.
Area, square miles, 821.
Population, 13,657.
Railroads, 3.
Miles of railroad, 53.01.
Assessed valuation of property of all kinds, $8,179,578.
Mineral resources—Clays; coal; limestone; sandstone; possibly natural gas and petroleum; gravel.

The vitrifiable brick clays are represented by an average of two analyses of samples taken from 14 to 16 miles west of Graham, as follows:

	Per cent.
Silica	60.90
Alumina	20.95
Oxide of iron	5.30
Lime	0.05
Magnesia	0.25
Soda	1.40
Potash	1.85
Titanic acid	0.80
Water	6.30
Water, hygroscopic	2.70
	100.50
Total fluxes	8.85

These clays become steel hard at temperatures varying from 1,900 to 2,000 degrees F. They would probably make good material for the manufacture of paving brick.

Young county has been a producer of coal for some years. The composition of the coal from this county is given in the following average of two analyses:

	Per cent.
Moisture	9.00
Volatile combustible matter	35.79

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	Per cent.
Fixed carbon	39.08
Ash	16.13
	100.00
Sulphur	2.88
B. t. u. per pound	9,601

There are opportunities for petroleum and natural gas, but no producing wells have been brought in.

ZAPATA COUNTY.

Location—Extreme southern part; borders on the Rio Grande.
County seat—Zapata; population, 250.
Area, square miles, 1,269.
Population, 3,809.
Railroads, none.
Assessed valuation of property of all kinds, $1,156,818.
Mineral resources—Clays, and possibly coal, petroleum and natural gas. A sample of natural gas from this county gave 887 B. t. u. per cubic foot, an excellent result.

ZAVALLA COUNTY.

Location—Southwest Texas.
County seat—Batesville; population, 80; elev. 700.
Area, square miles, 1,328.
Population, 1,889.
Railroads, 1.
Miles of railroad, 35.28.
Assessed valuation of property of all kinds, $5,427,805.
Mineral resources—Clays; coal; lignite.
The mineral resources have not been investigated.

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CHAPTER VI.

THE MINING LAW.

SCHOOL LANDS—RELATING TO PROSPECTING AND DEVELOPING MINERALS THEREON.

S. B. No. 128.] Thirty-third Legislature, 1913.

An Act relating to prospecting and developing minerals on land owned by the State of Texas, by the public free school fund and University and Asylum funds, and upon such land as the State has heretofore sold or may hereafter sell with reservation of the mineral therein and upon such land as may have been purchased, with the waiver of mineral rights; and also the prospecting and development of minerals in fresh water lakes and in islands, bays, marshes, reefs and salt water lakes; relating to the disposition of the minerals and mineral rights therein; authorizing the lease of such lands and the mineral rights therein; providing royalties and other compensation to be paid to the State therefor; appropriating to certain funds the proceeds arising from such development; authorizing the adoption of rules and regulations to carry out the provisions of this Act; providing penalties for violations of the provisions of this Act; prescribing terms upon which, and the method by which, access to mineral deposits may be acquired by condemnation or otherwise; repealing Chapter 1, Title 93, of the Revised Civil Statutes adopted in 1911, and declaring an emergency.

Be it enacted by the Legislature of the State of Texas:

SECTION 1. All public school, University, Asylum and the other public lands, fresh water lakes, islands, bays, marshes, reefs, and salt water lakes, belonging to the State of Texas, and all lands which may hereafter be so owned, and all lands which have been heretofore sold or disposed of by the State of Texas, with a reservation of minerals or mineral rights therein, as well as all lands which may hereafter be sold with reservation of minerals or mineral rights therein, and lands purchased with relinquipment of the minerals therein, shall be included within the provisions of this Act and shall be open to mineral prospecting, mineral development and the lease of mineral rights therein in the manner herein provided. Only citizens of the United States and such other persons as have heretofore declared, or shall hereafter declare, their intention of becoming such shall be entitled to acquire any rights under this Act. It is declared to be the

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policy of the State to open all such lands to mineral prospecting and development on a system providing for the payment into the State Treasury to the credit of the permanent free school, University, Asylum or other funds, of certain rents and royalties upon the gross output of any minerals or mineral product thereon.

SEC. 2. Any person or association of persons, corporate or otherwise, desiring to obtain the right to prospect for and develop petroleum oil or natural gas that may be in any of the surveyed public free school land, University or Asylum or other public lands of the State, which may be unsold at the time such desire is made known as herein provided, or in any of said land which has heretofore been sold with the reservation of minerals therein to the public free school fund or other fund, and such of said land as has heretofore been purchased with the relinquishment of the minerals therein by the purchaser, or in any of said land that may hereafter be sold with the reservation of minerals therein, also in any of the fresh water lakes owned by the State or public free school fund or other fund, and also in any of the islands, bays, marshes, reefs and salt water lakes, may do so under the regulations, terms and conditions of this Act, together with such rules and regulations as may be adopted relative thereto and necessary for the execution of the purpose of this Act by the Commissioner of the General Land Office.

SEC. 3. One desiring to obtain the right to prospect for and develop petroleum oil or natural gas that may be in any of the surveyed lands mentioned herein shall first file with the clerk of the court of the county in which the area desired, or a portion thereof, is situated, or with the clerk of the county to which said county may be attached for judicial purposes, a separate application in writing for each tract applied for, designating the land in which he desires to acquire the aforesaid rights. No individual or corporation shall be awarded exceeding 1,280 acres of the public lands of the State for oil or gas development purposes, and no individual or corporation shall be awarded exceeding 200 acres for oil and gas development purposes within ten miles of any producing oil or gas well. The said 1,280 acres in undeveloped territory, or the 200 acres within ten miles of any producing oil or gas well, may be in as many different tracts of land of fresh water lakes as the applicant may desire; provided, the applicant correctly describes the land or fresh water lakes desired for development purposes. The lines of all tracts less than a whole survey shall conform to the exterior of the lines of the survey of which it may be a part, as nearly as practicable. The said clerk shall file and record the application or applications aforesaid and note the same on his register opposite the entry of the proper survey if surveyed, or in his record book if unsurveyed, giving the time of filing, and the

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applicant shall file such application in the General Land Office, together with one dollar as filing fees, within thirty days after the date it was filed by the county clerk.

SEC. 4. One desiring to obtain the right to prospect for and develop petroleum oil or natural gas in any of the State's islands, salt water lakes, bays, marshes, reefs and fresh water lakes owned by the State, or in any of the unsurveyed public land, shall first file a separate written application for each tract applied for with the county surveyor of the county in which the area or a part of same may be situated, or the county to which said county may be attached for surveying purposes, giving a designation of the same sufficient to identify it. The surveyor shall immediately file and record same, giving time of such filing, and within ninety days thereafter he shall survey and deliver to the applicant the field notes and original application. Said papers, together with one dollar as filing fee, shall be filed in the General Land Office, within one hundred days after the application was filed with the county surveyor, and not thereafter. Locations and surveys under this section shall not exceed 1,280 acres in undeveloped territory, and not exceeding 200 acres within ten miles of a producing gas or oil well. All locations and surveys under this section shall, if practicable, be of regular form, but in every case the line or lines adjacent to other surveys shall conform to the lines of such adjacent surveys. If there are no adjacent surveys the surveyor shall connect such survey with some established survey on the main land.

SEC. 5. When the Commissioner receives an application or application and field notes, as provided for in the two preceding sections, within the time required, together with the filing fee of one dollar, he shall file same, and if, upon examination, said papers are found to be correct, and in compliance with this Act, and if the status of the area applied for is within the provisions herein, the applicant shall be entitled to the right to prospect for and develop the petroleum oil or natural gas that may be under the surface embraced in the application and field notes, and as evidence of such right the Commissioner shall issue to each applicant a permit after the applicant shall have complied with the conditions hereinafter imposed.

SEC. 6. Before the issuance of the permit provided for in the preceding section the applicant shall pay to the Commissioner of the General Land Office ten cents per acre for each acre embraced in the application and field notes. Thereupon a permit shall be issued to the applicant, conferring upon him an exclusive right to prospect for and develop petroleum oil or natural gas within the designated area for a term not to exceed two years. Within thirty days after the expiration of the first year the owner of the permit shall pay another ten cents per acre, as in

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the first instance. Upon the termination of the period for which the original permit was granted, and the receipt of satisfactory evidence of the compliance with the conditions prescribed in Section 7 of this Act, and such compliance shall not have led to the discovery of petroleum oil or natural gas in commercial quantities, then the Commissioner may grant an extension of the permit for a term not to exceed one year upon the payment by the applicant or his successors in interest of an additional fee of twenty-five cents per acre. No extension, however, shall be granted unless satisfactory proof of an effort towards the development of the area included in the permit has been made in good faith and the expenditure of the sum required and duly submitted as set forth in Section 7 of this Act.

SEC. 7. Before the expiration of six months after the date of the permit the owner of said permit shall in good faith commence actual work necessary to the physical development of said area, and if petroleum oil or natural gas is not developed the owner or manager shall, on or before the thirty days after the expiration of twelve months from the date of the permit, file in the General Land Office a sworn statement supported by two disinterested, credible witnesses, that such actual work was begun within the six months aforesaid, and that petroleum oil or natural gas has not been discovered in commercial quantities and that a bona fide effort to develop said area was made during the six months preceding the filing of said statement during the two years covered by said permit, the owner thereof shall expend not less than four thousand dollars in a bona fide effort for the development of such area, unless such area has sooner been developed or abandoned. The owner or manager shall, within thirty days after the expiration of the two years from the date of the permit, file with the Commissioner of the General Land Office a sworn statement, supported by two disinterested, credible witnesses, that such bona fide effort for the development of the area has been made, stating in what condition, and showing the expenditure thereof. A failure to file either of the sworn statements herein provided for and within the time specified, or the filing of a statement untrue or false in material matters, or the failure to expend the sum named in a bona fide effort toward the development of the area or areas, shall work a revocation of said permit and the termination of the rights of the owner. Such termination shall be endorsed by the Commissioner of the General Land Office, upon a duplicate copy of the permit retained in the General Land Office. Upon the termination of such permit the area shall again be subject to location by another than the forfeiting owner. The expenditure herein required for development purposes may be made upon one or more contiguous tracts embraced in a permit, and shall be sufficient for the en-

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tire area embraced in one such permit. The amount herein required to be expended in development purposes shall be required on each and every non-contiguous area. A separate permit shall be issued for each non-contiguous area, but may contain an entire contiguous area of two or more adjacent tracts of land. An application may embrace contiguous portions of different tracts or surveys. An assignment by deed or other form of transfer, and also a lien of any form may be executed upon any claim to any person, association of persons, corporate or otherwise, that may be qualified to obtain a permit or lease in the first instance; provided, that deed or other evidence of sale, assignment or lien shall be recorded in the county where the property or a part thereof is situated, and shall be filed in the Land Office within sixty days after the date thereof, accompanied by a filing fee of one dollar. If such instrument shall not be filed in the Land Office within the time required, such deed or evidence of transfer or evidence of lien shall not have the effect to convey the property, nor shall the obligations incurred therein be enforceable.

SEC. 8. If at any time within the life of the permit one should develop petroleum oil or natural gas in commercial quantities, the owner or manager shall file in the Land Office a statement of such development within thirty days thereafter, and thereupon the owner of the permit shall have the right to lease all or part of the area included in the permit, upon the following conditions:

(1). An application and a first payment of $2.00 per acre for a lease of the area included in a permit shall be made to the Commissioner of the General Land Office within thirty days after the discovery of petroleum oil or natural gas in commercial quantities.

(2). A lease may be granted for a period of ten years, or such portion thereof as the applicant may desire, and with the option of renewal or renewals for an equal or a shorter period upon the payment of a cash sum of $2.00 per acre in advance on the entire area included in any lease and an equal sum annually in advance thereafter during the life of such lease, and in addition thereto the owner of such lease shall pay a sum of money equal to a royalty of one-eighth of the value of the gross production of petroleum oil.

(3). The owner of a permit shall not take, carry away or sell any petroleum oil or natural gas found in any area before such owner shall have obtained a lease therefor; provided, such owner may use for fuel such portion of said substances as may be necessary for the continued development of the area without accounting therefor. In addition to the $2.00 per acre annually in advance, the owner of a gas well shall pay a sum of money equal to 10 per cent. of the meter output of all gas sold. The

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said royalty on petroleum oil, or natural gas, shall be paid to the Commissioner of the General Land Office monthly during the life of the lease. In all such payments the owner or manager shall accompany the remittance with a sworn statement of the amount produced, and the market price of the output, and a copy of any pipe or pipe lines or tank receipts, check or memoranda of amount put out or into such lines or tanks. The books and accounts and the receipts and discharges of all lines, pipe lines or tanks and gas lines and gas pipes, and all other matters pertaining to the production, transportation and marketing of the output shall be open to the examination and inspection at all times by the Commissioner of the General Land Office or his representative or any other representative of the State. The value of any unpaid royalty or royalties and any sum or sums due to the State upon any lease contract shall become a prior lien upon all production of petroleum oil or natural gas produced upon the leased areas to secure the payment of any royalties and sums due the State.

SEC. 9. In the event any land or water included within the operation of this Act has heretofore been or may hereafter be sold by the State with the reservation of minerals therein, or has been purchased by one with the waiver of mineral rights, such land shall be subject to prospect and lease as set forth in this Act, but the owner of the permit or lease shall pay to the owner of the surface of the land twenty cents per acre per annum in advance during the life of the permit or lease, and the first payment shall be paid to the Commissioner of the General Land Office for the use of the owner of the surface, prior to the issuance of such permit, and said sum so paid to the owner of the surface rights shall be in full compensation for all damages to such surface by reason of the ingress and egress and operation necessary to development and the operation under the permit or lease; provided, that if the owner or lessee of the surface will not accept the payment of twenty cents per acre per annum, as above provided, and the lessee of the mineral rights cannot agree with such owner or lessee of the surface rights on the compensation to be paid for the use of the damages to such surface rights, then the right thereto and the ingress and egress from such mine or mining claim may be acquired by condemnation as hereinafter provided.

SEC. 10. No person, association of persons, corporate or otherwise, shall hold or own at one time, by permit or lease, direct or through assignment, nor hold or own a controlling interest in more than two sections of 640 acres each, more or less, of surveyed school land, University, Asylum or other public land, nor more than 1,280 acres of islands, lakes, bays, marshes, reefs, or unsurveyed school, University or Asylum or other public land

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in any undeveloped field, nor more than two hundred acres within ten miles of any producing oil or gas well.

SEC. 11. A person or association of persons, corporate or otherwise, applying for a permit or lease, shall file with the application a sworn statement showing what interest, if any, the applicant or each of the members of the association or each stockholder in the corporation may hold in any other permit or lease issued by the State. When the Commissioner is satisfied that the applicant is entitled to such permit or lease he shall issue the permit for a term not to exceed two years, and the lease may be issued for such time as the applicant may elect, not to exceed ten years, with the right of a renewal or renewals upon such terms and conditions as hereinbefore provided. The permit or lease shall contain the terms upon which it is issued, and such other matters as the Commissioner may deem important to the rights of the State or applicant. Should a permit or lease be issued upon a statement by the applicant or applicants, or either of them, which is false or untrue in any material fact, the Commissioner may cancel such permit or lease when sufficiently informed as to such false or untrue statements.

SEC. 12. Should the owner of a permit fail or refuse to proceed with reasonable diligence in a bona fide effort to develop an area included in such permit, the Commissioner of the General Land Office may cancel same. Should the holder of a lease fail or refuse to proceed with reasonable diligence and in a bona fide effort to develop, operate and put out the product of a producing well of petroleum oil or natural gas at any time during the life of a lease, the Commissioner of the General Land Office may cancel such lease contract. In the event of a cancellation of a permit or lease contract for the causes mentioned in this section, the area included therein shall be subject to the application of another than the forfeiting owner, in the same manner as in the first instance; provided, should a lease covering a producing well be canceled an application for a lease of such area or part thereof may be made direct to said Commissioner, and a copy of such lease shall be filed in the office of the County Clerk.

SEC. 13. Coal and Lignite.—All coal and lignite underlying the surface of the lands and waters, as defined by this Act, shall be subject to prospect and development under the following terms and conditions:

Any person, firm or corporation desiring to prospect for coal and lignite shall file with the clerk of the county in which the land is situated his application covering not more than 2,560 acres. Said application shall be made in the same manner and form as is required by other sections of this Act, and permits shall be granted by the Commissioner of the General Land Office authorizing such prospect and development upon the following terms

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and conditions, subject to forfeiture for breach of any of said terms and conditions: said permit shall run for a period of twenty years with preference right of renewal to lessee for three months after the expiration thereof. Lessee shall, within sixty days after the granting of said permit, begin to prospect for coal and lignite, and shall, within ten months thereafter, sink a shaft 6x8 feet to coal or lignite, drive a tunnel in said coal or lignite, to a distance of twenty yards, and shall crib said shaft and prop said tunnel in strict conformity with specifications to be furnished by mine inspector of this State, and shall, within sixty days thereafter, begin to mine said coal or lignite, and shall continuously mine the same, provided same be situated within two miles of any railroad; but, if said coal or lignite be situated more than two miles from any railroad, then said lessee shall be allowed five years within which to begin to mine said coal and lignite; provided, that in the last named contingency the said five years shall not be reckoned as any part of the time covered by said lease. The royalty to be paid to the State shall not be less than six cents per ton for coal and not less than four cents per ton for lignite, for each and every ton of two thousand pounds of said product sold. Said royalties shall be due and payable to the State monthly, and the same shall be accompanied by a sworn statement of the lessee showing the number of tons so mined as well as the number of tons sold; provided, further, that the royalties herein provided shall, after the third year of operation of said mine, equal a minimum of $4.00 per acre for each and every acre covered by said lease. Said mine shall be kept in continuous operation, barring strikes, lockouts, fires, floods and other accidents over which the lessee has no control; provided, further, that said lessee shall not be required to operate said mine at a time when the market price for said product is such as to cause same to be run at a loss to the lessee.

SEC. 14. Other Minerals.—All other minerals and mineral rights that may be in the lands or waters included in Section 1 of this Act, shall be subject to prospect and development under the terms and conditions hereinafter stated.

SEC. 15. A mining claim upon deposits, veins or lodes of quartz or any other rocks, bearing silver, gold, cinnabar, lead, tin, iron, copper or any other metallic substance, may equal but shall not exceed 1,500 feet in length and 600 feet in width; such claim may be of unlimited depth, but shall be bounded by four vertical planes. All claims shall be in the form of a parallelogram unless such form is prevented by adjoining rights, and the locator shall be entitled to the use of all superficial area bounded by the enclosed lines of the claim and to all minerals therein upon the terms hereinafter provided. In all conflicts priority of location shall decide.

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SEC. 16. The locator of any mining claim shall post up at the center of one of the end lines of the claim a written notice stating the name of the location and of the claim and date of posting, and shall describe the claim by giving the number of feet in length and width and direction the claim lies in length from the notice, together with the section number, if known, and the county, and shall place stone or concrete markers at the four corners not less than three feet high and otherwise describe the corners so that they can be readily found. The notice shall be posted in a conspicuous place so that it can be easily seen.

SEC. 17. The locator shall, within three months after the date of posting the required notices, file with the country clerk of the county in which the land, or a part of the same, is situated, a copy of the notice provided for in Section 16 hereof, together with a recording fee of one dollar ($1), and an affidavit that the locator has performed ten feet of work in the shape of tunnels, shaft or open cut on the claim, and within one year from the date of the posting of the original notice the locator shall file with the county surveyor of the county in which the land or a part thereof is situated, an application in writing for the survey of the claim, giving the name of the claim and such description of its boundary and location as will enable the surveyor to identify the land. The affidavit shall be accompanied by a fee of twenty dollars ($20) unless its tender is waived, and also with an affidavit stating the kind of the claim; also the date of the first posting of the notice on the claim by the applicant, and that the notice has not been post dated or its date changed. Upon receiving the application and affidavit and fee, the surveyor shall file the application and affidavit, and shall forthwith proceed to survey the claim. After the field notes are recorded and a plot of the survey is made by the surveyor, which shall be within ninety days, he shall deliver the application and the affidavit, together with the field notes and plat, to the applicant or his agent, who shall forward the same within sixty days to the Commissioner of the General Land Office, together with one dollar ($1.00) as a filing fee. The fee of twenty dollars ($20) shall cover all charges by the surveyor in connection with any one claim.

SEC. 18. In any mining claim of any character shall be filed upon jointly by two or more claimants, and any one or more of them shall fail to contribute his proportion of any expenses required in this Act within the necessary time the co-owner or co-owners who have paid the fees or other expenditures required by this Act may, at the expiration of the time in which the payment is required to be made, and after the same has been made, give notice in writing to such defaulting co-owner, or if such defaulting co-owner cannot be found, then by publication in a newspaper published in the county where the claim is situated, or if no such

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newspaper be published in such county, then in the newspaper published nearest thereto, at least once a week for four successive weeks. If, after such publication notice, such delinquent shall fail or refuse to contribute his proportion of the expenditures required, his interests in the claim shall cease and shall be forfeited to the co-owner or co-owners who have made the required expenditures. An affidavit of such co-owner or co-owners of the claim, accompanied with notices given, shall, when recorded in the office of the county clerk, be sufficient evidence of such delinquency and forfeiture.

SEC. 19. Claims usualy called placers, including all forms of metallic deposits, excepting those described in Section 15, as well as any mining claim covering deposits of kaolin, baryta, salt, marble, fire clay, gypsum, nitrates, mineral paints, asbestos, marl, natural cement, clay, onyx, mica, precious stones or any other non-metallic minerals and stones valuable for ornamental or building material, shall be subject to location and entry and lease on the same terms and conditions and upon similar proceedings as are provided herein for vein or lode claims; provided, all placer claims located shall conform as nearly as practicable to existing surveys and their sub-divisions, and no placer claim shall include more than forty acres, and no aggregation of individual claims shall exceed three hundred and twenty acres. After the location of any mining claim and survey thereof and the registration thereof in the office of the General Land Commissioner, as hereinbefore provided, the locator shall be entitled to the exclusive uses and possession thereof so long as the locator shall continue to do the amount of work upon such claims equivalent to one hundred dollars ($100) worth of labor per annum; provided, that an affidavit shall be filed before the expiration of each and every year, setting forth in detail the development work that has been done that year, with an itemized statement of the value thereof. Such statement shall be filed in the office of the Commissioner of the General Land Office, also in the office of the county clerk of the county where such mining claim is located, or the county to which such county is attached for judicial purposes. The Commissioner of the General Land Office may, at his discretion, require additional proof that such development work has been done.

SEC. 20. In full payment to the State for the right to take from any mining claim of any character described in Sections 15 and 19, any mineral wealth or deposit whatever, whether metallic or non-metallic, the owner or holder of such claim shall pay unto the State a royalty or rental equivalent to five per centum of the total gross output sold or disposed of from such mine or mining claim of any character therein defined. If any locator shall fail to post the location notice or to file with the county clerk the

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location notice and affidavit, or shall fail to file with the county surveyor the application for survey and affidavit hereinbefore required, or shall fail to file with the Commissioner of the General Land Office the application, affidavit, file notice and plat hereinbefore required; or shall fail to comply with any of the terms or conditions herein required, such claim shall be subject to forefeiture by the Commissioner of the General Land Office by an endorsement upon such application theretofore filed of the word "forfeited," signed officially by him, and thereupon all rights in such mining claim and rights of the locator or claimant in such mining claim shall utterly cease and determine, and the same shall be subject to relocation; provided, that the Commissioner of the General Land Office may, upon satisfactory showing to him why such conditions or requirements were not complied with, reinstate such claim upon the written request of one or more of the locators, claimants or owners, filed in his office; provided, further, that no rights of any others have intervened at the date of filing of such request in the General Land Office. One interested in the claim at the date it was forfeited shall not be eligible to relocate or file upon the same land or in behalf of any other person within a period of six months next ensuing after such forfeiture, and any attempt to make such location by such person shall be wholly void.

SEC. 21. Any locator, claimant or owner of any mining claim under this Act is authorized to fell and remove for building and mining purposes any timber or any trees growing or being upon any unoccupied public lands under such rules and regulations as the Commissioner of the General Land Office may, from time to time, provide for the protection of timber and other growth upon such lands and such other purposes.

SEC. 22. Nothing in this Act contained shall ever be construed to destroy, invalidate or impair any valid claim, right or interest existing in, to or concerning any lands whatsoever at the date of the passage of this Act, or of any pre-emptor, purchaser, claimant, settler, locator or any other person whatsoever.

SEC. 23. The locator or owner of a mining claim shall have the right to occupy within the limits of his claim so much of the surface ground as is strictly necessary for the use and exploitation of the mineral deposits and for the buildings and works necessary for mining operations and for the treating and smelting of the ore produced on such claims and to occupy within and without the limits of his claim the necessary land for right of way, for ingress and egress to and from his claim, for roadways, or railways; provided, that if the locator or owner of the mineral right cannot agree with the owner or lessee of the surface right in regard to the acquiring of same and in regard to the compensation for the injury incident to the opening and the working

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of such mine and the access thereto, he may apply to the judge of the county court of the county in which such mining claim is located, by filing a written petition setting forth with a sufficient description the property and surface right sought to be taken and the purpose for which the same is to be taken, and it shall be the duty of such county judge of such county to appoint three disinterested freeholders to examine, pass upon and determine the damages and compensation to be paid to the owner of such surface right or other property necessary to be taken, and the proceedings for acquiring or condemning such surface right or other property shall, at all times, so far as possible, be covered by the laws relating to the condemnation of rights of way for railway companies, the locator or owner of such mining claim occupying the position of the railway company, and an appeal may be taken from the decision of the commissioners upon the same terms and conditions and subject to the same regulations and qualifications prescribed by law for the condemnation of right of way for railways.

SEC. 24. Upon all lands of any character heretofore sold or leased by the State in which the minerals or mineral rights were reserved to the State, the public free school fund University fund, Asylum or other fund, the grantee or lessee, as the case may be, shall have the prior right for six months after date upon which this Act shall take effect to prospect, locate and apply for the mineral rights upon such land heretofore sold or leased to him, and after the expiration of such six months such preference or priority right shall cease and such grantee or lessee shall have no prior or preference rights over any other prospector or locator.

SEC. 25. The holder of a permit, a lease, a prospecting right, or any other right acquired under this Act may relinquish one or more of such permits, leases, claims or prospector's claims at any time by filing a relinquishment in the General Land Office after it is duly recorded by the clerk of the proper county, but such holder shall not be entitled to a refund of any sum paid thereon.

SEC. 26. The Commissioner of the General Land Office shall collect and transmit to the State Treasurer all money derived from the development of any minerals or substance named herein and found on the public free school land or other public land, and it shall be credited to the permanent free school fund or other fund to which the land from which such money is derived is set apart. All money derived from the development of any mineral or substances named herein and found on other than public free school land, University or Asylum land, shall be credited to the game, fish and oyster fund for the use of that department. All fees shall be credited to the general revenue in

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the manner provided by law for other fees paid into the General Land Office.

SEC. 27. All development in water or on islands, marshes and reefs shall be done under such regulations as will prevent the pollution of the water, and for the prevention of such pollution the Game, Fish and Oyster Commissioner may be called upon for assistance in the adoption and enforcement of rules and regulations for the protection of said waters. For a violation of such rules and regulations the Commissioner of the General Land Office may revoke a permit or cancel a lease.

SEC. 28. The rights acquired under this Act shall be subject to taxation as is other property after the owner shall have paid to the State the sums necessary to perfect his rights.

SEC. 29. The issuance of a permit or lease or the filing of a prospector's affidavit on unsold land included within this Act shall not prevent the sale of the land without minerals on which such mineral or mining claim may be located under the laws applicable to such land, but in case of such sale after an application has been filed with the county clerk so herein provided, the purchaser of such land shall not be entitled to any part of the proceeds of such minerals or mining location, nor other compensation, nor shall such purchaser have any action for damages done to such land by or resulting from the proper working of or operation under such permit, lease or prospector's claim.

SEC. 30. The Commissioner of the General Land Office shall have general supervision of all matters necessary for the proper administration of the purpose of this Act, and he is authorized to adopt rules and regulations and to alter or amend them from time to time as may appear necessary for the protection of the interest involved and the execution of the purposes of this Act not inconsistent with its provisions and the Constitution of the State.

SEC. 31. No individual, firm, association of persons or corporations shall be entitled to locate or lease more than five mining claims of any character defined in Section 15 and 19, and any location or lease made contrary to this section shall be void; provided, however, that upon coal or lignite mines or deposits any one individual, firm, association of persons or corporation shall be entitled to locate or lease a total area not to exceed twenty-five hundred and sixty (2560) acres.

SEC. 32. If any provision of this bill shall be held to be unconstitutional either as applied to any character of land or water described in Section 1, or in any other respect, such decision shall not be construed to invalidate the provisions of this Act with regard to any other character of land (or) waters described in Section 1 or any other provision of this Act.

SEC. 33. Chapter 1, Title 93, of the Revised Civil Statutes of

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1911, relating to mines and mining, and all other laws and parts of laws relating to the sale of mineral lands are hereby repealed.

SEC. 34. The fact that there is no adequate statute by which the mineral resources of this State can be properly developed on the public lands and the waters of the State, creates an emergency, and an imperative public necessity exists that the constitutional rule requiring bills to be read on three several days in each house should be suspended, and that this should be placed upon its third reading and final passage, and take effect from and after its passage.

Approved April 9, 1913.

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CHAPTER VII.

LOCATION, ELEVATION AND POPULATION OF CITIES, TOWNS AND VILLAGES.

Under "Population" the figures are from the census of 1910, except those marked *, which are for the year 1912-1913.

The highest point in the State appears to be El Capitan Peak, Guadalupe Mountains, Culberson county, 8690 feet. The highest town is Fort Davis, Jeff Davis county, 4927 feet.

The county towns are printed in capital letters.

Place.	County.	Elevation.	Population.
Abbott	Hill	713	475
Abernathy	Hale	3,310	160
ABILENE	Taylor	1,719	12,806*
Abneys	Harrison	304	.....
Acampo	Shackelford	1,885	.....
Acme	Hardeman	1,517	75
Adams	Bexar	718	.....
Addicks	Harris	100	26
Addison	Dallas	625	65
Adkins	Bexar	546	183
Adrian	Orange	25	.....
Adsul	Newton	102	.....
Ady	Potter	3,140	.....
Afton	Dickens	3,249	45
Aguilares	Webb	617	30
Aiken	Floyd	3,261	.....
Akron	Smith	382	.....
Alamo	Cass	242	54
Alanreed	Gray	2,993	250
Alba	Wood	447	625
ALBANY	Shackelford	1,410	999
Alco	Angelina	312	.....
Aldridge	Robertson	135	.....
Aledo	Parker	874	250
Aleman	Hamilton	1,168	.....
Alexander	Erath	1,165	381
Alfalfa	El Paso	3,687	.....
Algerita	San Saba	1,300	.....
Algoa	Galveston	37	80
ALICE	Jim Wells	205	2,136
Alief	Harris	86	112
Allamore	El Paso	4,530	.....
Allen	Collin	652	260
Allendale	Wichita	1,016	.....
Allenfarm	Brazos	205	67
Allenhurst	Matagorda	45	.....
Alley	Hale	3,322	.....
Alleyton	Colorado	188	251
Alma	Ellis	473	158
Almeda	Harris	66	63
Aloe	Victoria	111	.....

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Place.	County.	Elevation.	Population.
ALPINE	Brewster	4,481	800
Altair	Colorado	207	150
Alta Loma	Galveston	25	150
Alto	Cherokee	433	672
Alton	Hidalgo	156	.....
Altuda	Brewster	4,638	.....
Alum	Wilson	350	25
Alvarado	Johnson	693	1,155
Alvin	Brazoria	51	1,453
Alvord	Wise	880	1,023
Amanda	Kinney	1,085	.....
AMARILLO	Potter	3,676	13,585*
Ambia	Lamar	553	64
Ambrose	Grayson	529	.....
Amelia	Jefferson	31	21
Ames	Liberty	78	.....
Amherst	Lamb	3,701	.....
Amigo	Smith	375	.....
Anacacho	Kinney	1,349	.....
ANAHUAC	Chambers	23	300
Anchor	Brazoria	41	60
ANDERSON	Grimes	368	572
Andrews	Caldwell	341	.....
Andy	Cherokee	325	.....
Ange	Uvalde	1,007	.....
Angelina	Angelina	215	34
ANGLETON	Brazoria	31	898
Angus	Navarro	444	29
Anna	Collin	707	402
Annarene	Archer	1,171	.....
Anneta	Parker	847	63
Annona	Red River	370	429
Anson	Jones	1,716	1,842
Antelope	Jack	4,205	166
Antelope Gap	Mills	1,488	.....
Anthony	Fannin	529	.....
Anville	Wilson	449	.....
Appleby	Nacogdoches	405	208
Aquilla	Hill	525	450
Aragon	Presidio	4,900	.....
Aransas Pass	San Patricio	5	1,197
Arcadia	Galveston	33	168
Archer City	Archer	1,085	825
Arcola	Fort Bend	67	76
Argyle	Denton	659	197
Ariola	Hardin	41	.....
Arion	Milam	454	.....
Arispe	El Paso	4,356	.....
Arlington	Tarrant	616	1,794
Armstrong	Washington	26	.....
Armstrong	Williamson	600	.....
Arno	Reeves	2,663	60
Arnold	Collin	167	29
Aroya	Ward	2,663	.....
Arp	Smith	499	.....
Artesia	LaSalle	461	60
Artesia Wells	LaSalle	440	.....
Arthur City	Lamar	426	163

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Place.	County.	Elevation.	Population.
Arvana	Dawson	2,976	.....
Ash	Henderson	544	.....
Ashwood	Matagorda	58	.....
Ashworth	Trinity	200	.....
Asia	Polk	226	.....
Aspermont	Stonewall	1,773	600
ATHENS	Henderson	490	2,261
Atkinson	Williamson	585	.....
Atlanta	Cass	264	1,604
Atlas	Lamar	515	76
Aubrey	Denton	681	575
Aue	Bexar	1,131	.....
Augustus	Garza	2,421	.....
AUSTIN	Travis	466	33,218*
Avery	Red River	476	550
Avinger	Cass	397	600
Avoca	Jones	1,530	200
Avondale	Tarrant	845	18
Axtell	McLennan	524	220
Bacon	Wichita	1,044	.....
Baggetts	McLennan	667	.....
Bagwell	Red River	476	320
Bailey	Fannin	705	360
BAIRD	Callahan	1,708	1,710
Baker	Cottle	1,740	.....
Baldridge	Pecos	2,513	.....
Baldwin	Harrison	214	40
Ball	Dallas	450	.....
BALLINGER	Runnels	1,630	3,536
BANDERA	Bandera	1,258	419
Bangs	Brown	1,603	512
Banquete	Nueces	82	20
Bard	Wilbarger	1,426	.....
Bardwell	Ellis	478	400
Barker	Harris	109	.....
Barnhart	Irion	2,549	.....
Barnum	Polk	222	29
Barreda	Cameron	38	.....
Barry	Navarro	502	350
Barstow	Ward	2,557	800
Bartholomew	Trinity	243	.....
Bartlett	Williamson	599	1,815
Bassett	Bowie	245	63
BASTROP	Bastrop	368	1,707
Bateman	Bastrop	473	33
BATESVILLE	Zavalla	700	80
Battle Hill	Eastland	1,600	.....
Baxter	Henderson	482	35
BAY CITY	Matagorda	55	3,156
Bay Prairie	Matagorda	40	.....
Bayview	Galveston	25	.....
Beach	Montgomery	212	.....
Beadle	Matagorda	37	.....
Beasley	Fort Bend	112	70
Beaukiss	Williamson	502	114
BEAUMONT	Jefferson	21	25,433*

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Place.	County.	Elevation.	Population.
Beckville	Panola	326	606
Bee Caves	Travis	960	23
BEEVILLE	Bee	214	3,269
Belcher	Montague	887	181
Belding	Pecos	3,196	.....
Belen	El Paso	3,652	25
Bellaire	Harris	62	.....
Bellcamp	Young	1,203	.....
Bellevue	Clay	1,029	413
Bells	Grayson	674	496
Belt Junction	Tarrant	91	.....
BELLVILLE	Austin	263	1,076
Belleville Yard	Austin	200	.....
BELTON	Bell	511	4,164
Belton Junction	Bell	530	.....
Benarnold	Milam	392	250
Benavides	Duval	390	233
Benbrook	Tarrant	658	76
Benchley	Robertson	301	80
Bencini	Newton	107	.....
Bender	Harris	79	.....
Benford	Polk	234	25
Ben Franklin	Delta	465	400
BENJAMIN	Knox	1,456	400
Bennetts	Palo Pinto	747	200
Benoit	Runnels	1,716	25
Benonine	Wheeler	2,142	160
Ben West	Jackson	37	.....
Berclair	Goliad	194	250
Bergs	Bexar	542	.....
Berkshire	Wise	834	.....
Bernicker	Fisher	2,137	.....
Bertram	Burnet	1,268	450
Berwick	Jack	1,093	.....
Bessemer	Llano	1,009	.....
Bessmay	Jasper	92	850
Bethel	Tarrant	694	.....
Bettie	Upshur	330	284
Big Cypress	Camp	349	.....
Big Lake	Reagan	2,677	400
Big Sandy	Upshur	336	750
BIG SPRING	Howard	2,397	4,102
Big Wells	Dimmitt	532	.....
Billum	Tyler	182	.....
Birds	Tarrant	723	.....
Bisbee	Tarrant	705	.....
Bishop	Nueces	495	.....
Bissell	Armstrong	300	.....
Bivins	Cass	314	302
Bixby	Cameron	65	.....
Black	Parmer	3,944	.....
Blackwell	Nolan	2,100	.....
Blair	Taylor	2,002	25
Blair	Liberty	351	.....
Blanchard	Polk	222	.....
Blanco	Blanco	1,250	469
Blanket	Brown	1,601	425
Blanks	Caldwell	562	.....

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Place.	County.	Elevation.	Population.
Bleakwood	Newton	100	25
Blessing	Matagorda	44	400
Blix	Angelina	170	.....
Blocker	Harrison	266	25
Blodgett	Harris	58	.....
Bloomburg	Cass	309	400
Blooming Grove	Navarro	599	903
Bloomington	Victoria	61	25
Blossom	Lamar	530	871
Blue	Lee	475	30
Bluffdale	Erath	880	436
Bluffton	Llano	1,000	48
Blum	Hill	582	600
Bobo	Shelby	320	.....
BOERNE	Kendall	1,405	886
Bogata	Red River	418	247
Boise	Deaf Smith	3,955	.....
Boling	Wharton	83	.....
Bolton	LaSalle	433	.....
Bomarton	Baylor	1,409	400
Bon Ami	Jasper	148	35
BONHAM	Fannin	568	4,844
Bonita	Montague	929	375
Bonita Junction	Nacogdoches	354	.....
Bonney	Brazoria	51	27
Bonus	Wharton	144	63
Bon Wier	Newton	76	100
Booth	Fort Bend	76	50
Boracho	Culberson	4,451	.....
Borden	Colorado	293	.....
Bovina	Parmer	4,064	200
Bowers	Polk	255	.....
Bowie	Montague	1,125	2,874
Bowieville	Matagorda	30	.....
Boyce	Ellis	519	160
Boyd	Wise	738	550
Boynton	Angelina	276	.....
BRACKETTVILLE	Kinney	1,100	925
Braden	Bexar	1,319	.....
Bradshaw	Taylor	1,976	120
BRADY	McCulloch	1,670	2,669
Bragg	Hardin	124	.....
Brambleton	Tarrant	649	.....
Brand	Scurry	2,365	.....
Brandenburg	Stonewall	1,674	.....
Brandon	Hill	621	401
Bransford	Tarrant	665	76
Brashear	Hopkins	513	26
Bravo	Hartley	4,161	.....
Brazoria	Brazoria	32	633
Brazos	Palo Pinto	801	175
BRECKENRIDGE	Stephens	1,200	750
Bremond	Robertson	466	808
BRENHAM	Washington	332	4,714
Bridgeport	Wise	754	2,000
Brin	Kaufman	538	.....
Britton	Ellis	560	260
Broadus	San Augustine	240	120

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Place.	County.	Elevation.	Population.
Bronson	Sabine	326	550
Bronte	Coke	1,893	635
Brookesmith	Brown	1,342	150
Brookshire	Waller	168	700
Brookston	Lamar	590	237
Broome	Sterling	2,211	.....
Broughton	Cherokee	533	.....
Browndel	Jasper	227	.....
BROWNFIELD	Terry	....	275
Brownsboro	Henderson	376	89
BROWNSVILLE	Cameron	33	12,310*
BROWNWOOD	Brown	1,342	6,967
Bruceville	McLennan	592	325
Brundage	Dimmitt	539	.....
Brunswick	Cherokee	352	.....
BRYAN	Brazos	367	4,132
Bryson	Jack	1,227	350
Buchel	DeWitt	264	.....
Buckeye	Matagorda	43	40
Buckholts	Milam	525	500
Bud Matthews	Shackelford	1,760	.....
Buda	Hays	716	450
Buenos	Garza	2,819	.....
Buffalo	Leon	397	310
Buffalo Gap	Taylor	1,979	249
Bulcher	Cooke	746	.....
Bullard	Smith	502	450
Buna	Jasper	76	160
Bunker Hill	Jasper	70	.....
Burdette	Caldwell	458	.....
Burk	Wichita	1,030	.....
Burkburnett	Wichita	1,054	.....
Burke	Angelina	272	161
Burkland	Williamson	711	.....
Burleson	Johnson	708	368
Burlingame		395	.....
Burlington	Milam	421	600
BURNET	Burnet	1,294	981
Burr	Wharton	97	.....
Burris	Lubbock	3,106	.....
Burroughs	Austin	148	.....
Burton	Washington	415	425
Bush Land	Potter	3,788	40
Butlers	Bastrop	461	.....
Byers	Clay	1,007	800
Bynum	Hill	662	350
Byrd	Dimmitt	600	.....
Cabell	Fort Bend	88	.....
Cabra	Val Verde	1,417	.....
Cactus	Webb	607	31
Caddo Mills	Hunt	533	550
Calallen	Nueces	31	60
Calaveras	Wilson	413	369
CALDWELL	Burleson	406	1,476
Calef	Tarrant	838	.....
Call	Newton	95	100
Callan	Menard	2,080	.....

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Place.	County.	Elevation.	Population.
Calvert	Robertson	335	2,579
Calvin	Nueces	469	.....
Camden	Polk	305	66
CAMERON	Milam	390	3,263
Camey	Denton	610	.....
Campbell	Hunt	585	508
Campbellton	Atascosa	244	27
Canaan	Limestone	414	.....
CANADIAN	Hemphill	2,340	1,648
CANTON	Van Zandt	....	600
Cantrell	Nacogdoches	343	.....
Canutillo	El Paso	3,751	.....
Canyon	Stephens	1,150	.....
Canyon City	Randall	3,566	.....
Caplen	Galveston	12	30
Capron	Haskell	1,567	.....
Carbon	Eastland	1,591	479
Carbondale	Bowie	252	.....
Carey	Childress	1,789	60
Cariker	Nacogdoches	369	.....
Carl	Navarro	354	.....
Carlos	Grimes	255	.....
Carlsbad	Tom Green	2,011	.....
Carlyle	Clay	972	.....
Carmine	Fayette	447	400
Carmona	Polk	254	42
Carney	Haskell	1,560	.....
Caro	Nacogdoches	426	.....
Carpenter	Bexar	501	60
Carrizo Springs	Dimmitt	600	350
Carrollton	Dallas	448	525
Carruth	Dallas	612	.....
Carson	Fannin	2,865	.....
Carthage	Panola	292	1,350
Cartwright	Kaufman	453	.....
Caruthers	Angelina	326	.....
Cash	Hunt	494	60
Cason	Morris	337	205
Cass	Cass	241	98
Cassin	Bexar	523	.....
Castell	Llano	1,207	112
Cat Springs	Austin	307	406
Cedar	Kaufman	331	.....
Cedar Creek	Bastrop	445	296
Cedar Hill	Dallas	820	242
Cedar Lane	Matagorda	27	.....
Cedar Park	Williamson	812	21
Cedar Valley	Travis	1,179	16
Cedric	Crosby	3,173	.....
Celeste	Hunt	660	821
Celina	Collin	663	724
Center	Shelby	345	1,684
Center Point	Kerr	450	1,573
CENTERVILLE	Leon	....	400
Chadwick	Lampasas	1,364	.....
Chamberlin	Dallam	3,952	.....
Chancellor	Pecos	3,397	.....
Chancy	Angelina	290	.....

Digitized by Google

Place.	County.	Elevation.	Population.
Chandler	Henderson	400	341
Chaney Junction	Harris	58	.....
CHANNING	Hartley	3,817	300
Chappell Hill	Washington	317	813
Chapman	Runnels	1,919	.....
Charlotte	Atascosa	545	.....
Chatterton	Harrison	294	.....
Chautauqua	Callahan	1,525	.....
Checkup	Cherokee	427	.....
Cheek	Jefferson	21	25
Cheetham	Colorado	264	.....
Chenango	Brazoria	461	.....
Cheneyboro	Navarro	250	100
Cherokee	San Saba	1,496	250
Chester	Tyler	237	200
Chesterville	Colorado	158	100
Chew	Anderson	371	.....
Chico	Wise	942	642
Chihuahua	Hidalgo	124	.....
CHILDRESS	Childress	1,877	3,818
Chillicothe	Hardeman	1,400	1,207
Chilton	Falls	425	400
China	Jefferson	45	174
Chireno	Nacogdoches	318	276
Chispa	Jeff Davis	4,079	.....
Chita	Jefferson	41	.....
Choctaw	Grayson	578	.....
Chorn	Scurry	3,307	.....
Chriesman	Burleson	452	150
Christine	Atascosa	667	.....
Christoval	Tom Green	2,000	.....
Cibolo	Guadalupe	718	250
Cima	Tyler	292	.....
Circleville	Williamson	550	100
Cisco	Eastland	1,608	2,410
Citrus Grove	Matagorda	24	.....
CLAIREMONT	Kent	2,127	150
Clairette	Erath	1,093	120
Clara	Bee	134	.....
CLARENDON	Donley	2,727	1,946
Clarks	Calhoun	31	.....
CLARKSVILLE	Red River	442	2,065
CLAUDE	Armstrong	3,405	692
Clawson	Angelina	372	82
Clay	Burleson	208	120
Clearfork	Caldwell	567	.....
Clear Fork	Jones	1,506	.....
Clear Lake	Collin	464	100
CLEBURNE	Johnson	764	11,587*
Cleveland	Liberty	160	800
Clevenger	Nacogdoches	225	100
Click	Llano	1,050	19
Cliffside	Potter	3,408	.....
Clifton	Bosque	670	1,137
Clifton-by-the-sea	Galveston	20	.....
Climax	Nacogdoches	200	.....
Cline	Uvalde	1,000	39
Clint	El Paso	3,630	200

Digitized by Google

Place.	County.	Elevation.	Population.
Clinton	Harris	567	.....
Clip	Goliad	230	.....
Clodine	Fort Bend	99	24
Clopton	Bastrop	506	.....
Closner	Hidalgo	119	.....
Clyde	Callahan	1,980	495
Coahoma	Howard	2,399	350
Coates	Taylor	1,940	25
Cobbs	Kaufman	523	200
Coburn	Lipscomb	2,644	20
Codman	Roberts	2,885	.....
COLDSPRING	San Jacinto	....	439
COLEMAN	Coleman	1,690	3,046
Coleman Junction	Coleman	1,680	.....
Collegeport	Matagorda	13	200
College Station	Brazos	346	.....
Collins	Nueces	184	.....
Collinsville	Grayson	744	791
Colmesneil	Tyler	295	632
Cologne	Goliad	130	34
COLORADO	Mitchell	2,067	1,840
Columbia	Brazoria	34	612
COLUMBUS	Colorado	201	1,824
COMANCHE	Comanche	1,358	2,756
Combes	Cameron	38	.....
Comfort	Kendall	1,429	600
Commerce	Hunt	548	2,818
Como	Hopkins	532	650
Comstock	Val Verde	1,550	63
Comyn	Comanche	1,241	40
Concord	Hardin	36	100
Conejo	Presidio	4,905	.....
Conlen	Dallam	2,927	.....
Conley	Johnson	746	.....
Connell	Orange	22	.....
CONROE	Montgomery	213	1,374
Converse	Bexar	713	63
Conway	Carson	3,419	.....
Cook's Point	Burleson	308	87
Cook's Springs	Grayson	636	.....
Cookville	Titus	422	425
Cooledge	Limestone	535	200
COOPER	Delta	495	1,513
Copeville	Collin	561	204
Coppell	Dallas	516	118
Copperas Cove	Coryell	1,086	600
Coraleta	Bexar	518	.....
Corbet	Navarro	397	69
Corbyn	Comal	663	.....
Corinth	Denton	579	41
Corlena	Dallam	4,520	200
Corley	Bowie	295	66
CORPUS CHRISTI	Nueces	35	9,720*
Corrigan	Polk	226	461
CORSICANA	Navarro	418	9,934*
Cortes	Matagorda	66	.....
Coston	Archer	1,203	.....
COTULLA	LaSalle	442	1,880

Digitized by Google

Place.	County.	Elevation.	Population.
Coughran	Atascosa	345	.....
Coupland	Williamson	525	300
Courchesne	El Paso	3,720	.....
Courtney	Grimes	186	228
Covington	Hill	766	300
Cowart	Tyler	265	.....
Cowen	Wise	873	.....
Cozart	Taylor	1,990	.....
Crabb	Fort Bend	87	.....
Craft	Cherokee	493	14
Craig	Victoria	124	.....
Crandall	Kaufman	430	500
Cranell	Refugio	47	.....
Crawford	McLennan	687	516
Creamer	Comanche	1,231	25
Creedmoor	Travis	630	145
Cresson	Hood	1,047	279
Crisp	Ellis	399	84
CROCKETT	Houston	350	3,947
Crosby	Harris	46	150
CROSBYTON	Crosby	3,058	120
Cross	Grimes	356	125
Cross Plains	Callahan	1,710	300
Cross Timbers	Harris	75	.....
Crowder	Grimes	228	.....
CROWELL	Foard	1,463	1,341
Crowley	Tarrant	764	275
Crum	Anderson	350	.....
Crystal City	Zavalla	580	350
Crystal Falls	Stephens	1,000	.....
Crystal Lake	Anderson	305	.....
CUERO	DeWitt	177	3,109
Cumby	Hopkins	635	700
Currie	Navarro	410	.....
Cushing	Nacogdoches	420	600
Cuyler	Carson	3,452	.....
Cypress	Harris	144	125
Cypress Mill	Blanco	976	38
DaCosta	Victoria	67	.....
Dacus	Montgomery	261	100
Daffan	Travis	616	.....
DAINGERFIELD	Morris	397	1,100
Dakin	Young	1,139	.....
Dalberg	El Paso	4,185	.....
Dale	Caldwell	520	95
DALHART	Dallam	3,985	2,580
DALLAS	Dallas	425	92,104*
Dallas Junction	Tarrant	31	.....
Dalzell	Brown	1,468	.....
Danbury	Brazoria	28	40
Danforth	Hockley	3,341	.....
Darden Springs	Lee	444	.....
Darling	Maverick	920	.....
Darnoc	San Saba	1,168	.....
Daugherty	Kaufman	459	.....
Dauphin	Henderson	366	.....
Davenport	Red River	798	.....

Digitized by Google

Place.	County.	Elevation.	Population.
Davidson	Burleson	346	.....
Davy	Hill	615	.....
Dawn	Deaf Smith	3,758	.....
Dawson	Navarro	482	803
Dayton	Liberty	84	650
Dean	Clay	974	.....
Deanville	Burleson	355	106
Deaver	Grayson	619	.....
DECATUR	Wise	1,058	1,651
Deepwater	Harris	42	59
Deerpark	Harris	39	26
DeKalb	Bowie	407	650
Delaware	Brown	1,457	.....
Deleon	Comanche	1,268	1,015
Delery	Matagorda	57	.....
Delhi	Caldwell	529	37
Delphine	Jefferson	11	.....
DEL RIO	Val Verde	948	4,000
Delrose	Upshur	346	.....
Denison	Grayson	723	14,409*
Denny	Falls	507	.....
DENTON	Denton	620	4,732
Deport	Lamar	415	700
Derby	Frio	542	30
Dermott	Scurry	2,442	.....
Dessau	Travis	675	16
Detroit	Red River	482	1,056
Devers	Liberty	58	187
Devil's River	Val Verde	966	.....
Devine	Medina	670	1,042
DeWalt	Fort Bend	75	49
D'Hanis	Medina	881	266
Dial	Fannin	500	.....
Dialville	Cherokee	494	250
Diboll	Angelina	252	100
Dickens	Dickens	2,200	375
Dickinson	Galveston	21	250
Dickworsham	Clay	888	.....
Dilley	Frio	586	500
Dillworth	Gonzales	288	120
Dime Box	Lee	372	129
Dinero	Live Oak	117	17
Dinsmore	Wharton	97	.....
Dixieland	Reeves	2,681	20
Dixon	Hunt	509	74
Dobbin	Montgomery	239	168
Dobson	LaSalle	495	.....
Dockville	Nacogdoches	256	.....
Dodd City	Fannin	669	.....
Dodge	Walker	402	350
Dodsonville	Collingsworth	1,730	.....
Dolores	Brazoria	32	.....
Donie	Freestone	490	100
Donna	Collin	88	28
Donovan	Angelina	299	.....
Don-Tol	Wharton	75	.....
Dora	Nolan	2,518	100
Dorchester	Grayson	861	100

Digitized by Google

Place.	County.	Elevation.	Population.
Dorso	Val Verde	1,456	.....
Doty	Orange	25	.....
Dothan	Eastland	1,614	75
Doucette	Tyler	299	60
Douro	Ector	3,080	.....
Dowell	Fisher	266	.....
Downman	Jasper	137	.....
Downsville	McLennan	394	134
Doyle	Limestone	434	.....
Draper	Bowie	242	.....
Driscoll	Nueces	165	.....
Druso	Houston	219	100
Dryden	Terrell	2,104	50
Dublin	Erath	1,450	2,551
Duff	Shelby	468	.....
Dugger	Garza	2,690	.....
Duke	Fort Bend	72	26
Dulls	LaSalle	361	.....
Dumas	Moore	3,638	200
Dumont	Harris	40	.....
Dunagan	Angelina	306	.....
Duncan	Hartley	3,913	.....
Duncanville	Dallas	727	150
Dundee	Archer	1,143	250
Dune	Lynn	3,067	.....
Dunham	Nacogdoches	278	.....
Dunlay	Medina	997	72
Dunn	Fayette	332	.....
Durham	Borden	258	.....
Durst	Angelina	325	.....
Duster	Comanche	1,390	126
Duval	Travis	650	.....
Dyer	Fort Bend	116	.....
Dyersdale	Harris	62	.....
Eagle Flat	El Paso	4,450	.....
Eagle Ford	Dallas	441	54
Eagle Lake	Colorado	170	1,717
Eagle Pass	Maverick	735	3,536
Earls	Parker	895	.....
East Bernard	Wharton	121	250
East Columbia	Brazoria	34	.....
East Dallas	Dallas	465	.....
Easterly	Robertson	386	46
Eastgate	Liberty	82	.....
EASTLAND	Eastland	1,421	855
Easton	Rusk	264	.....
East Temple	Polk	241	.....
East Winnsboro	Wood	525	.....
Ebenezer	Hidalgo	45	.....
Echo	Bell	642	.....
Echo	Orange	19	.....
Ector	Fannin	652	404
Edburke	Brazoria	32	.....
Eddy	McLennan	672	575
Eden	Concho	733	450
Edgar	DeWitt	323	79
Edgewood	Van Zandt	460	550

Digitized by Google

Place.	County.	Elevation.	Population.
EDINBURG	Hidalgo	422	.....
Edmonds	Brazoria	32	.....
EDNA	Jackson	72	1,144
Edroy	San Patricio	105	.....
Edwards	Clay	972	.....
Egan	Johnson	838	100
Egypt	Wharton	119	25
Eickhoff	Titus	298	.....
Elam	Dallas	459	.....
El Buey	Harris	39	.....
El Campo	Wharton	110	1,778
Eldridge	Terrell	2,357	25
Electra	Wichita	1,229	640
Elevation	Milam	514	.....
Elgin	Bastrop	577	1,707
Eliasville	Stephens	950	.....
Elizabeth	Hardin	33	.....
Elkhart	Anderson	390	600
Elkton	Smith	487	.....
Ella	Jim Wells	157	.....
Ellard	Hunt	458	.....
Ellinger	Fayette	289	488
Elliott	Robertson	379	41
Elmaton	Matagorda	40	.....
Elmdale	Taylor	1,786	.....
Elmendorf	Bexar	506	300
Elmmott	McLennan	518	247
Elmo	Kaufman	504	410
Elna	Wise	935	.....
El Par	Jim Wells	161	.....
EL PASO	El Paso	3,711	49,505*
El Toro	Jackson	75	.....
Elvista	Jefferson	7	.....
Emerson	Terrell	3,090	.....
Emhouse	Navarro	475	225
EMORY	Rains	564	426
Enal	Angelina	172	.....
Encinal	LaSalle	575	627
Engle	Fayette	364	226
Englewood	Harris	430	.....
Enloe	Delta	495	326
Ennis	Ellis	548	5,669
Enos	Waller	126	.....
Eppler	Garza	2,244	.....
Erin	Jasper	59	21
Eskota	Fisher	1,939	150
Estelline	Hall	1,759	400
Etholen	El Paso	4,646	.....
Etoile	Nacogdoches	314	40
Eunice	Swisher	3,432	.....
Eureka	Harris	71	.....
Eustace	Henderson	430	250
Evadale	Jasper	42	.....
Evans	Donley	3,117	.....
Evans	Hardeman	1,530	.....
Evansville	Leon	425	.....
Ewelder	San Patricio	51	.....
Ewing	Angelina	312	.....

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Place.	County.	Elevation.	Population.
Exit	Hartley	3,325	.....
Experimental Farm	Hidalgo	182	.....
Eylau	Bowie	339	.....
Ezelle	Ellis	491	.....
Fabens	El Paso	3,612	25
Fairbanks	Harris	94	71
Fairland	Burnet	973	60
Fairlie	Hunt	549	248
Fair Plains	Cooke	783	.....
Faker	Camp	319	.....
FALFURRIAS	Brooks	119	750
Fallon	Limestone	504	.....
Falls City	Karnes	309	300
Fancher	Baylor	1364	.....
Fannett	Jefferson	20	80
Fannin	Goliad	143	200
Fant City	Live Oak	200	.....
Faber	Angelina	305	.....
Farmers Branch	Dallas	465	205
Farmersville	Collin	611	1,848
Farrar	Limestone	426	73
FARWELL	Parmer	4,095	200
Farwell-Texico	Parmer	4,095	.....
Fate	Rockwall	584	212
Faulkner	Ellis	391	.....
Fauna	Harris	51	.....
Fawcett	Bastrop	332	.....
Fay	Culberson	4,018	.....
Fayetteville	Fayette	411	274
Fedor	Lee	424	.....
Feely	Val Verde	1,242	.....
Felicia	Liberty	51	.....
Felton	Bell	712	.....
Feodora	Terrell	2,475	.....
Ferguson	Hale	3,343	.....
Ferguson	Upshur	356	.....
Fernando	Cameron	14	.....
Ferris	Ellis	468	1,233
Field	Potter	3,249	.....
Field Creek	Llano	1,407	111
Finlay	El Paso	3,943	.....
Finley	Bowie	254	.....
Finney	Hale	3,551	.....
Fisher	Dallas	531	.....
Fisher	Fisher	1,920	21
Fishers	Travis	678	.....
Fiskville	Travis	700	.....
Fitze	Nacogdoches	452	.....
Fitzmaurice	Matagorda	127	.....
Fitzpatrick	Harrison	225	.....
Flake	Galveston	12	.....
Flanagan	Rusk	266	68
Flatonia	Fayette	453	886
Flat Rock	Reagan	2,588	.....
Fleming	Comanche	1,296	.....
Fletcher	Hardin	35	.....
Fletcher	Orange	16	.....

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Place.	County.	Elevation.	Population.
Flewellen	Fort Bend	135	.....
Flint	Smith	525	200
Florence	Williamson	650	363
FLORESVILLE	Wilson	389	1,398
Florine	Bexar	571	.....
Flournoy	San Augustine	301	.....
Floyd	Hunt	601	231
FLOYDADA	Floyd	3,137	664
Fluvanna	Scurry	2,665	450
Flynn	Cass	472	22
Folsom	Potter	3,635	.....
Footes	Gregg	273	.....
Forbes	Newton	111	.....
Formil	Coryell	822	.....
Forney	Kaufman	473	1,114
Forreston	Ellis	540	233
Fort Bliss	El Paso	3,874	.....
Fort Brown	Cameron	57	.....
Fort Chadbourne	Coke	1,960	.....
Fort Clarke	Kinney	1,050	.....
Fort Davis	Jeff Davis	4,927	1,061
Fort Griffin	Shackelford	1,275	.....
Fort Hancock	El Paso	3,517	34
Fort McIntosh	Webb	460	.....
Fort McKavett	Menard	2,155	136
Fort Ringgold	Starr	250	.....
FORT STOCKTON	Pecos	2,948	439
FORT WORTH	Tarrant	614	73,312
Fostoria	Montgomery	170	150
Fouts	Liberty	106	.....
Fowler	Bosque	565	69
Fowlerton	LaSalle	335	.....
Fowlkes	Wichita	1,092	.....
Francis	Wise	911	.....
Francitas	Jackson	42	.....
Franco	Parker	1,101	.....
FRANKLIN	Robertson	443	869
Frankston	Anderson	389	550
Fratt	Bexar	722	.....
FREDERICKSBURG	Gillespie	1,721	2,100
Fredericksburg Jct.	Gillespie	1,310	.....
Freestone	Freestone	506	.....
Fresenius	Hardin	49	.....
Fresnal	Cameron	25	.....
Fresno	Fort Bend	79	.....
Frio	LaSalle	3,998	.....
Friona	Parmer	3,958	200
Friotown	Frio	625	59
Frisco	Collin	645	625
Frost	Navarro	528	702
Fruitland	Atascosa	1,050	.....
Fruitvale	Van Zandt	458	50
Frys Gap	Cherokee	576	.....
Fulda	Baylor	1,229	.....
Fuller	Scurry	2,181	.....
Fullerton	Liberty	81	.....
Fullerville	Scurry	2,416	.....
Fulshear	Fort Bend	132	247

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Place.	County.	Elevation.	Population.
Fuqua	Liberty	117	.....
Gabriel River	Williamson	911	.....
Gainesmore	Matagorda	21	.....
GAINESVILLE	Cooke	730	7,624
Galgo	Presidio	4,793	.....
Gallatin	Cherokee	355	125
Galloway	Cass	294	.....
GALVESTON	Galveston	6	40,289*
Gammon	Fisher	2,159	.....
Ganado	Jackson	71	558
Ganahl	Kerr	1,510	.....
Garden City	Glasscock	2,800	200
Gardendale	LaSalle	586	.....
Garfield	Travis	494	63
Garland	Dallas	541	804
Garner	Parker	935	200
Garrett	Ellis	557	162
Garrison	Nacogdoches	380	627
Gary	Panola	286	341
Garza	Denton	586	250
Gaston	Fort Bend	126	25
Gastonia	Kaufman	456	.....
GATESVILLE	Coryell	774	1,929
Gause	Milam	387	289
Gay Hill	Washington	344	216
Genoa	Harris	47	100
George	Madison	363	.....
GEORGETOWN	Williamson	442	3,096
George West	Live Oak	161	.....
Germania	Midland	2,745	.....
GIDDINGS	Lee	512	1,375
Gilbert	Jefferson	35	.....
Giles	Donley	2,396	36
GILMER	Upshur	370	1,484
Ginger	Rains	480	75
Girard	Kent	2,113	.....
Girvin	Pecos	2,285	.....
Gladewater	Gregg	333	550
Glazier	Hemphill	2,601	475
Glen Flora	Wharton	117	500
Glenham	Bastrop	465	.....
Glenrio	Deaf Smith	3,812	.....
Glenrose	Somervell	600	.....
Glidden	Colorado	234	84
Godley	Johnson	895	500
Golden	Wood	422	350
Goldsboro	Coleman	1,994	150
GOLDTHWAITE	Mills	1,580	1,129
GOLIAD	Goliad	167	1,261
Gomez	Reeves	3,272	.....
GONZALES	Gonzales	300	3,139
Goodlett	Hardeman	1,578	100
Goodnight	Armstrong	3,145	150
Goodrich	Polk	97	100
Goodson	Smith	476	.....
Goodwin	Comal	691	68
Gordon	Palo Pinto	956	609

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Place.	County.	Elevation.	Population.
Goree	Knox	1,445	675
Gorman	Eastland	1,435	963
Gossett	Kaufman	322	18
Gould	Smith	355	.....
Gover	Grayson	522	.....
Graford	Palo Pinto	1,003	.....
GRAHAM	Young	1,045	1,569
GRANBURY	Hood	698	1,336
Grand Lake	Montgomery	136	.....
Grand Prairie	Dallas	528	994
Grand Saline	Van Zandt	407	1,065
Grand View	Johnson	695	1,018
Granger	Williamson	578	1,708
Granite Mountain	Burnet	866	34
Grapeland	Houston	480	550
Grapevine	Tarrant	635	681
Graphite	Llano	987	.....
Grayburg	Hardin	46	.....
Grayton	El Paso	4,224	.....
Greathouse	Jack	1,148	.....
Green	Karnes	607	.....
Greenbrier	Smith	393	.....
Green Lake	Calhoun	32	.....
Greens	Harris	49	.....
GREENVILLE	Hunt	552	9,696*
Gregory	San Patricio	32	122
Greta	Refugio	64	.....
Griffing	Newton	10	.....
Grimes	Grimes	337	.....
Griswold	Polk	226	.....
GROESBECK	Limestone	447	1,454
Groom	Carson	3,214	.....
Grover	Williamson	1,148	.....
GROVETON	Trinity	323	1,076
Gruene	Comal	646	.....
Guadalupe	Reeves	2,853	49
Guda	Falls	365	.....
Guffey	Jefferson	18	200
Guild	Pecos	2,665	.....
Guion	Taylor	2,121	40
Gulf View	Galveston	14	.....
Gunter	Grayson	697	300
Gurley	Falls	382	138
Gustine	Comanche	1,193	212
Gypsum	Hardeman	1,578	.....
Hacienda	Uvalde	989	.....
Hagerville	Houston	328	66
Hale	Dallas	633	.....
HALLETTSVILLE	Lavaca	232	1,379
Halsell	Clay	957	60
Hallsville	Harrison	385	700
Hallville	San Saba	1,488	.....
Halstead	Fayette	318	.....
Ham	Henderson	383	35
Hamilton	Hamilton	1,250	.....
Hamiltonburg	Live Oak	157	.....
Hamlin	Jones	1,711	1,978

Digitized by Google

Place.	County.	Elevation.	Population.
Hammond	Robertson	408	115
Hampton	Tyler	288	.....
Hampton's	Nacogdoches	332	.....
Haney	Randall	3,593	.....
Hamrick	Coleman	1,828	.....
Happy	Swisher	3,564	250
Hamshire	Jefferson	17	31
Handley	Tarrant	590	156
Harbin	Erath	1,282	83
Harlem	Fort Bend	84	.....
Harlingen	Cameron	36	600
Harlow	Hunt	562	.....
Harmaston	Harris	73	.....
Harriet	Tom Green	1,832	.....
Harris	Fort Bend	112	.....
Harrisburg	Harris	45	563
Harrison	McLennan	457	51
Harrold	Wilbarger	1,235	375
Harrys	Rockwall	420	.....
Hartburg	Newton	34	75
HARTLEY	Hartley	3,907	200
Hartley	Montgomery	120	.....
Harvard	Camp	352	.....
Harwood	Gonzales	452	300
HASKELL	Haskell	4,013	2,436
Haslet	Tarrant	700	175
Hasse	Comanche	1,170	350
Hatchel	Runnels	1,717	40
Hathaway	Hardin	50	.....
Hawdon	Fort Bend	67	.....
Hawkins	Wood	394	350
Hawkinsville	Matagorda	20	.....
Hawley	Jones	1,648	400
Haymond	Brewster	3,879	27
Hayward	Nacogdoches	300	.....
Hazel	Clay	861	.....
Hazel	Hardeman	1,481	25
Head Works	Cameron	53	.....
Hearne	Robertson	305	2,352
Hebbronville	Jim Hogg	680	190
Hebert	Jefferson	20	.....
Hebron	Denton	517	.....
Hedley	Donley	2,626	325
Heidenheimer	Bell	519	249
HEMPSTEAD	Waller	251	1,849
HENRIETTA	Clay	886	2,104
Hermleigh	Scurry	2,392	625
Henderson	Rusk	470	1,750
Hensley	Jack	1,226	.....
HEREFORD	Deaf Smith	3,806	1,750
Herman	Wise	933	.....
Hermosa	Reeves	2,728	25
Herring	Cherokee	294	.....
Herrington	Brazos	196	.....
Hesse	Webb	1,207	.....
Hewitt	McLennan	656	79
Heyser	Calhoun	69	.....
Heywood	Cameron	44	.....

Digitized by Google

Place.	County.	Elevation.	Population.
Hetty	Hunt	461	.....
Hicks	Lee	432	.....
Hico	Hamilton	1,006	1,437
Higgins	Lipscomb	2,569	.....
High	Lamar	572	92
High Island	Galveston	8	78
Herndon	Coleman	2,058	.....
Hilda	Guadalupe	550	.....
Hillendahl	Harris	90	.....
Hillister	Tyler	185	72
Hillje	Wharton	100	.....
Hills	Lee	547	.....
HILLSBORO	Hill	621	6,115
Hills Prairie	Bastrop	355	49
Hilton	Grayson	691	.....
Hindes	Atascosa	395	.....
Hindman	Dawson	2,931	.....
Hinckley	Lamar	462	25
Hitchcock	Galveston	19	300
Hobbstown	Tom Green	1,950	.....
Hockley	Harris	223	296
Hodge	Tarrant	627	.....
Hoffman Junction	Titus	425	.....
Hogan	Cherokee	705	.....
Hogsett	Wise	956	.....
Holland	Bell	523	778
Holliday	Archer	1,055	130
Homer	Reeves	3,634	66
HONDO	Medina	887	.....
Honea	Montgomery	240	24
Honey Grove	Fannin	666	2,300
Honey Springs	Dallas	446	.....
Hooks	Bowie	375	500
Hoover	Gray	3,088	.....
Horton	Delta	489	.....
Horton	Jasper	416	.....
Hot Wells	El Paso	4,283	.....
House Junction	Fort Bend	65	.....
HOUSTON	Harris	53	93,122*
Houston Heights	Harris	63	6,984
Hovey	Pecos	3,530	.....
Howe	Grayson	846	581
Howland	Lamar	505	226
Howth	Waller	278	73
Hoxie	Williamson	611	.....
Hoya	Nacogdoches	286	.....
Hoyt	Wood	431	.....
Hubbard	Hill	627	1,843
Hudson	Tarrant	972	.....
Huff	Archer	1,030	25
Huffman	Harris	46	.....
Hughes Springs	Cass	373	600
Hull	Liberty	46	.....
Humble	Harris	92	1,250
Hungerford	Wharton	109	183
Hunter	Comal	628	162
Huntington	Angelina	335	350

Digitized by Google

Place.	County.	Elevation.	Population.
HUNTSVILLE	Walker	400	2,072
Hurdle	Upton	2,480	.....
Husbands	Hunt	562	.....
Hutchins	Dallas	467	204
Hudson	Randall	3,534	.....
Hutto	Williamson	659	563
Hyatt	Tyler	109	.....
Iago	Wharton	87	100
Iatan	Mitchell	2,209	125
Iberis	Taylor	1,858	.....
Idalou	Lubbock	3,238	.....
Idlewild	Bexar	681	.....
Immermere	Erath	1,067	.....
Ina	Milam	443	.....
Inari	Refugio	78	.....
Inez	Victoria	71	93
Ingleside	San Patricio	23	36
Ingram	Kerr	1,700	.....
Io	Goliad	175	.....
Iola	Grimes	333	200
Iona	Tarrant	950	.....
Iowa Park	Wichita	1,037	603
Iredell	Bosque	88[illegible]	571
Ireland	Coryell	1,065	.....
Isaacs	Milam	428	.....
Iser	El Paso	3,673	.....
Italy	Ellis	576	1,149
Itasca	Hill	704	1,356
Ives	Montgomery	158	.....
Ivy	Caldwell	440	.....
JACKSBORO	Jack	1,074	1,480
Jackson	Montgomery	227	.....
Jacksonville	Cherokee	516	2,875
Jamestown	Upshur	158	.....
Japonica	Kerr	1,800	.....
Jarrell	Williamson	547	.....
Jayton	Kent	2,016	700
Jean	Young	1,193	.....
Jeanetta	Harris	78	.....
Jeddo	Bastrop	448	.....
JEFFERSON	Marion	191	2,515
Jeffries	Ellis	518	.....
Jericho	Donley	3,151	75
Jermyn	Jack	1,183	.....
Jessie	Hill	415	51
Jester	Navarro	407	29
Jewett	Leon	506	586
Jiba	Kaufman	407	.....
Jimdale	Clay	965	.....
Jims Bayou	Cass	295	.....
Joel	Parmer	3,720	.....
Jno. Camp	Williamson	570	.....
Joaquin	Shelby	213	400
Johnson City	Blanco	1,200	.....
Johnstone	Val Verde	1,075	.....
Johntown	Red River	355	.....

Digitized by Google

Place.	County.	Elevation.	Population.
Joiner	Fayette	253	.....
Jolly	Clay	978	42
Jonesville	Harrison	258	300
Joppa	Burnet	1,106	.....
Jordan	Bastrop	440	.....
Josephine	Collin	588	274
Joshua	Johnson	923	482
Josselet	Haskell	1,570	.....
Josserand	Trinity	314	538
Jourdanton	Atascosa	484	500
Joyce	Bowie	299	.....
Juliff	Fort Bend	66	63
Justin	Denton	644	476
Justiceburg	Garza	2,208	.....
Kaffir	Swisher	3,478	.....
Kamey	Calhoun	37	.....
Karen	Montgomery	258	.....
Karnack	Harrison	237	72
KARNES CITY	Karnes	404	635
Kasota	Armstrong	3,467	.....
Katy	Harris	145	350
KAUFMAN	Kaufman	439	1,959
Keechi	Leon	292	62
Keeler	Johnson	787	.....
Keenan	Montgomery	255	172
Keeran	Victoria	24	.....
Keller	Tarrant	704	294
Keithton	Jasper	237	.....
Kellys	Walker	381	.....
Kellyville	Marion	280	.....
Keltys	Angelina	345	59
Kemah	Galveston	12	.....
Kemp	Kaufman	372	925
Kempner	Lampasas	876	125
Kendleton	Fort Bend	102	116
Kenedy	Karnes	271	1,147
Kenefick	Liberty	54	.....
Kennard	Houston	402	425
Kennedale	Tarrant	603	216
Kenney	Austin	383	202
Kent	Culberson	4,202	100
Kentuckytown	Grayson	810	112
Kerby	Hill	715	.....
Kerens	Navarro	365	945
KERRVILLE	Kerr	1,645	1,843
Kierseys	Falls	425	.....
Kildare	Cass	311	214
Kilgore	Gregg	371	700
Killeen	Bell	853	1,265
Kingola	Wilbarger	1,171	.....
Kingsbury	Guadalupe	606	346
Kingsland	Llano	856	194
King's Mill	Gray	3,358	.....
Kingston	Hunt	631	278
Kingsville	Nueces	66	975
Kinney	Kinney	1,027	.....
Kirby	Bexar	707	.....

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Place.	County.	Elevation.	Population.
Kirbyville	Jasper	101	1,000
Kirk	Bexar	662	.....
Kirkland	Childress	1,705	.....
Kirtley	Fayette	320	.....
Kirvin	Freestone	464	160
Kittie	Live Oak	169	.....
Kittrell	Walker	320	27
Kleburg	Dallas	439	100
Klondike	Delta	478	220
Knarf	Colorado	257	.....
Knickerbocker	Tom Green	2,025	.....
Knippa	Uvalde	984	28
Knox City	Knox	1,517	925
Kokernot	Gonzales	392	.....
Kolp Spur	Tarrant	570	.....
Kopperl	Bosque	574	329
Kosse	Limestone	500	764
Kouns	Travis	652	.....
KOUNTZE	Hardin	85	342
Kress	Swisher	3,418	225
Krum	Denton	725	550
Kyle	Hays	714	742
Kyle Quarry	Jasper	130	.....
LaBahia	Goliad	147	.....
Labatt	Wilson	407	.....
Lacerda	Nacogdoches	308	.....
Lacoste	Medina	719	250
Ladonia	Fannin	625	1,293
La Fruita	San Patricio	64	.....
LAGRANGE	Fayette	272	1,850
Lake	Robertson	324	.....
Lakenon	Hill	695	40
Lake Side	Colorado	170	.....
Lake Victor	Burnet	1,382	200
Lake Wichita	Wichita	1,032	.....
Lamarque	Galveston	17	53
Lambert	Parker	1,136	75
LAMESA	Dawson	2,931	500
Lamkin	Comanche	1,068	97
Lamont	Polk	130	.....
LAMPASAS	Lampasas	1,025	2,119
Lancaster	Dallas	512	1,115
Landa	Bexar	748	.....
Landes	Washington	365	.....
Landrum	Cameron	45	.....
Langtry	Val Verde	1,315	68
Lanier	Cass	355	.....
Lanius	Fisher	1,679	.....
Lansing	Harrison	408	.....
LaPaloma	Cameron	43	.....
LaPorte (West)	Harris	29	674
LaPrelle	Brazoria	62	.....
LAREDO	Webb	438	15,461*
Lariat	Parmer	3,961	.....
Lark	Carson	3,336	.....
La Rosa	Refugio	42	.....
LaRue	Henderson	478	100

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Place.	County.	Elevation.	Population.
Lasca	El Paso	4,472	.....
Lasher	Bastrop	462	.....
Lassater	Marion	335	100
Las Vegas	Dimmitt	557	.....
Lavernia	Wilson	475	342
Lavon	Collin	523	178
Laward	Jackson	43	23
Lawn	Taylor	1,953	.....
Lawrence	Kaufman	470	176
Lazare	Hardeman	1,606	30
League City	Galveston	23	525
Leah	Tyler	263	.....
Leakey	Real	1,600	318
Leander	Williamson	980	283
Leary	Bowie	380	75
Lebau	Lee	410	.....
Ledbetter	Fayette	443	310
Lee	Carson	3,470	.....
Leesburg	Camp	394	318
Lefors	Gray	2,900	.....
Leggett	Polk	269	300
Leigh	Harrison	229	125
Leith	Kaufman	463	.....
Lela	Wheeler	2,366	80
Lelavale	Hardin	110	.....
Lelia Lake	Donley	2,590	.....
Lem	Eastland	1,499	.....
Leming	Atascosa	482	.....
Lemley	Parker	1,192	.....
Lemon	Orange	32	.....
Lena	Fayette	314	.....
Lenoir	Lamar	532	.....
Lenox	Brewster	4,339	.....
Leonard	Fannin	704	990
Leoncita	Brewster	3,875	.....
Leonidas	Montgomery	165	.....
Leon Junction	Coryell	675	62
Leon Springs	Bexar	1,125	158
Lester	Randall	3,619	.....
Letitia	Harris	100	.....
Letot	Dallas	443	21
LeVerte	Jasper	102	.....
Levinson	Jeff Davis	3,885	.....
Levita	Coryell	932	89
Lewis	Anderson	331	.....
Lewisville	Denton	484	900
Lexington	Lee	456	525
LIBERTY	Liberty	30	980
Liberty Hill	Williamson	1,038	500
Lider	Hale	3,290	.....
Lillard	Hardin	38	.....
Lime City	Coryell	706	.....
Limestone	Freestone	523	.....
Lincoln	Lee	364	148
Lindale	Smith	559	658
LINDEN	Cass	270	675
Lindenau	DeWitt	184	46
Lindsay	Cooke	786	151

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Place.	County.	Elevation.	Population.
Lissie	Wharton	156	60
Littig	Travis	464	168
Little	Milam	343	.....
Littlefield	Lamb	3,510	.....
Little River	Bell	504	123
Liverpool	Brazoria	25	66
LIVINGSTON	Polk	236	1,024
LLANO	Llano	1,029	1,687
Lobo	Culberson	3,941	.....
LOCKHART	Caldwell	518	2,945
Lockney	Floyd	3,231	750
Lodi	Marion	253	200
Loeb	Hardin	32	.....
Lofton	Lynn	3,036	.....
Lometa	Lampasas	1,484	550
Lomita School	Hidalgo	104	.....
Lone Oak	Hunt	562	756
Long	Cameron	58	.....
Longfellow	Pecos	3,269	32
Longhorn	El Paso	3,984	.....
Longleaf	Angelina	286	.....
Longmott	Calhoun	21	29
Longs	Hardin	103	.....
LONGVIEW	Gregg	339	5,155
Longview Jct	Gregg	338	.....
Longworth	Fisher	1,963	.....
Lora	Roberts	2,663	.....
Loraine	Mitchell	2,266	633
Lorena	McLennan	593	675
Lorenzo	Crosby	3,215	.....
Lorine	Colorado	305	.....
Los Indios	Cameron	48	.....
Lott	Falls	522	1,021
Lotus	Harris	75	.....
Louetta	Harris	165	40
Louise	Wharton	90	500
Love	Cherokee	705	.....
Lovelady	Houston	300	525
Loving	Young	1,292	225
Loyal Valley	Mason	1,680	.....
Lozier	Pecos	1,529	.....
LUBBOCK	Lubbock	3,148	1,938
Lucas	San Patricio	114	.....
Lucern	Hansford	2,609	25
Lueders	Jones	1,555	425
Luella	Grayson	640	.....
LUFKIN	Angelina	323	2,749
Luke Wilson	Archer	1,063	.....
Luling	Caldwell	403	1,404
Lumberton	Hardin	46	.....
Lumm	Liberty	116	.....
Lyford	Cameron	34	75
Lyons	Burleson	346	459
Lytle	Atascosa	745	212
McAllen	Hidalgo	122	.....
McCampbell	San Patricio	23	.....
McCaulley	Fisher	1,867	400

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Place.	County.	Elevation.	Population.
McClure's	Nacogdoches	240	.....
McConnell	Haskell	1,516	.....
McCoy	Angelina	300	.....
McCoy	Atascosa	310	.....
McDade	Bastrop	566	418
McDow	Wharton	155	.....
McGee	Montague	548	.....
McGregor	McLennan	713	1,804
McKay	Ellis	423	.....
McKees	Val Verde	946	.....
McKINNEY	Collin	592	4,714
McLean	Gray	2,812	633
McNeil	Travis	837	132
Mabank	Kaufman	395	750
Mabelle	Baylor	1,265	.....
Macdona	Bexar	631	123
Macedonia City	Liberty	116	.....
Mackay	Wharton	105	.....
Macks	Wood	379	.....
Macksville	Comanche	1,103	.....
Maddeline	Calhoun	53	.....
Madden	El Paso	3,666	.....
Magenta	Oldham	3,233	.....
Mahl	Nacogdoches	521	80
Malakoff	Henderson	377	376
Malden	Armstrong	3,349	.....
Malone	El Paso	4,263	550
Malta	Bowie	410	800
Mamie	Hidalgo	497	.....
Manard	Angelina	292	.....
Manchaca	Travis	697	118
Manda	Travis	557	111
Mangum	Eastland	1,454	300
Manhattan	McLennan	750	.....
Mankins	Archer	1,086	.....
Mann	Navarro	450	.....
Manor	Travis	525	900
Mansfield	Tarrant	580	627
Manton	Angelina	322	.....
Manvel	Brazoria	56	113
Maple	Collin	998	.....
Marathon	Brewster	4,039	300
Marble Falls	Burnet	764	1,061
MARFA	Presidio	4,688	494
Margaret	Foard	1,370	.....
Marianna	Victoria	675	60
Marilee	Collin	214	.....
Marion	Guadalupe	644	525
Markham	Matagorda	57	.....
Marlin	Falls	383	3,878
Marquez	Leon	420	482
MARSHALL	Harrison	375	12,984*
Marston	Polk	190	.....
Martinez	Bexar	690	.....
Maryneal	Nolan	2,564	275
Marysville	Cooke	873	236
MASON	Mason	1,450	.....
Matagorda	Matagorda	9	482

Digitized by Google

Place.	County.	Elevation.	Population.
Mathis	San Patricio	161	250
Matlock	Dallam	4,035	.....
Maud	Bowie	284	375
Mauriceville	Orange	29	30
Maurin	Gonzales	307	.....
Maxon Springs	Brewster	3,533	.....
Maxwell	Caldwell	605	225
May	Brown	1,657	400
Maydelle	Cherokee	396	.....
Mayfield	Hill	587	.....
Mayotown	Nacogdoches	365	.....
Meadors	Dallas	581	.....
Meadow Lake	Grayson	800	.....
Medicine Mound	Hardeman	1,488	150
Medina	Bandera	618	117
Medio	Bee	206	.....
Megargel	Archer	1,288	275
Melissa	Collin	680	350
Melvin	McCulloch	1,849	80
MEMPHIS	Hall	1,980	1,936
MENARD	Menard	1,870	450
Mendota	Hemphill	2,540	50
Mercedes	Hidalgo	61	1,209
Mercury	McCulloch	1,426	375
Meredith	Johnson	781	.....
MERIDIAN	Bosque	791	718
Merit	Hunt	656	322
Merkel	Taylor	1,872	2,008
Mertens	Hill	533	400
Mertzon	Irion	2,184	.....
Mesquite	Dallas	491	687
Mesa	Grimes	312	.....
Metz	Ector	2,860	.....
Mewshaw	Cherokee	377	.....
Mexia	Limestone	534	2,694
Mexico Jct.	Limestone	460	.....
MIAMI	Roberts	2,802	400
Michelson	Wilson	444	.....
Middlewater	Hartley	4,080	40
Midfields	Matagorda	51	75
MIDLAND	Midland	2,769	2,192
Midline	Montgomery	136	.....
Midlothian	Ellis	749	868
Mifflin	Willacy	43	.....
Mikeska	Live Oak	127	30
Milano	Milam	485	481
Miles	Runnels	1,800	1,302
Milford	Ellis	601	766
Mill	Bailey	3,764	.....
Mill Creek	Washington	319	25
Miller	Dallas	418	.....
Millet	LaSalle	498	150
Millheim	Austin	177	59
Millican	Brazos	298	613
Millsap	Parker	812	475
Milvid	Liberty	85	.....
Mineola	Wood	414	1,706
Minerva	Milam	399	118

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Place.	County.	Elevation.	Population.
Mingo	Denton	574	.....
Mingus	Palo Pinto	946	1,000
Mission	Hidalgo	134	1,000
Missouri City	Fort Bend	84	.....
Mobberly	Titus	323	.....
Mobile	Tyler	199	62
Moccasin	Coryell	812	.....
Mofeta	Terrell	2,360	.....
Monahan	Ward	2,613	150
Monroe	Lubbock	3,257	.....
MONTAGUE	Montague	1,075	284
Monte Cristo	Hidalgo	178	.....
Monterey	Angelina	233	.....
Montgomery	Montgomery	286	672
Montgomery Jct.	Montgomery	325	.....
Montoya	El Paso	3,739	.....
Monument	Irion	2,320	.....
Moody	McLennan	783	983
Moore	Frio	650	325
Moran	Shackelford	1,350	400
Morey	Jefferson	15	.....
Morgan	Bosque	721	831
Morita	Howard	2,469	.....
Morrill	Cherokee	329	100
Moscow	Polk	310	263
Moselle	Tarrant	763	.....
Moss Creek	Nacogdoches	211	.....
Mostyn	Montgomery	237	.....
Moulton	Lavaca	383	900
Mound	Coryell	693	38
Mt. Calm	Hill	601	634
Mt. Houston	Harris	74	.....
MT. PLEASANT	Titus	405	3,137
Mt. Selman	Cherokee	692	168
MT. VERNON	Franklin	476	1,200
Muenster	Cooke	964	600
Muldoon	Fayette	343	160
Muleshoe	Bailey	3,744	.....
Mullen	Mills	1,430	.....
Mulvey	Polk	217	.....
Mumford	Robertson	257	193
Muncy	Floyd	3,156	.....
Munday	Knox	1,482	1,500
Munger	Limestone	502	40
Murchison	Henderson	453	120
Murdo	Oldham	3,527	.....
Murphy	Collin	575	92
Murray	Young	3,812	36
Murvaul	Panola	275	141
Musgrove	Franklin	427	58
Mustang	Denton	717	93
Myra	Cooke	916	325
Naclina	Nacogdoches	300	.....
NACOGDOCHES	Nacogdoches	283	3,369
Nadeau	Galveston	13	.....
Naples	Morris	399	1,178
Narcisso	Cottle	2,000	.....

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Place.	County.	Elevation.	Population.
Naruna	Burnet	1,476	29
Nash	Bowie	353	350
Natalia	Medina	686	.....
Navarro	Navarro	420	50
Navasota	Grimes	215	3,284
Neal	Madison	331	.....
Neches	Anderson	411	325
Nederland	Jefferson	25	250
Neelie	San Patricio	92	.....
Neff	Trinity	206	.....
Nelleva Jct.	Brazos	189	.....
Nelms	Trinity	224	.....
Nep	Cherokee	525	.....
Neuville	Shelby	323	450
Nevada	Collin	615	510
Newark	Wise	696	300
New Baden	Robertson	427	103
New Birmingham	Cherokee	557	.....
New Boston	Bowie	352	950
NEW BRAUNFELS	Comal	637	3,165
Newby	Leon	453	.....
Newcastle	Young	1,166	550
New California	Zavalla	673	.....
New Camp	Nacogdoches	312	.....
New Caney	Montgomery	98	127
Newlin	Hall	1,800	125
Newline	Marion	310	.....
Newsome	Camp	453	150
NEWTON	Newton	172	575
New Ulm	Austin	392	444
New Willard	Polk	215	.....
Neyland	Hunt	561	107
Niblock	San Saba	1,732	.....
Nickel	Gonzales	445	36
Nivac	Nacogdoches	411	.....
Nix	Lampasas	1,281	48
Nixon	Gonzales	396	850
Nocona	Montague	930	1,338
Nolanville	Bell	695	138
Nome	Jefferson	47	100
Nona	Hardin	68	50
Noonan	Medina	768	.....
Nopal	Presidio	4,817	.....
Nora	Lavaca	373	.....
Nordheim	DeWitt	404	400
Norias	Willacy	19	.....
Normangee	Leon	375	675
Normanna	Bee	273	175
Norris	Val Verde	905	.....
Northend	Washington	301	.....
North Ft. Worth	Tarrant	533	.....
North Houston	Harris	51	.....
North Jefferson	Marion	208	.....
North Pleasanton	Atascosa	373	.....
North Quarry	Fayette	315	.....
North Roby	Fisher	1,916	.....
Northrup	Lee	480	66
North Zulch	Madison	356	250

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Place.	County.	Elevation.	Population.
Norvall	Cherokee	273	.....
Norwood	Harrison	214	.....
Norwood	McLennan	388	.....
Norwood	Runnels	1,716	.....
Nottawa	Wharton	134	40
Novice	Coleman	2,028	275
Noyl Spur	Hardeman	1,446	.....
Nulo	El Paso	3,567	.....
Nursery	Victoria	134	177
Oak Cliff	Dallas	450	.....
Oak Grove	Bowie	429	50
Oak Hill	Travis	806	116
Oakville	Live Oak	90	431
Oakwood	Leon	290	906
Oasis	Dallas	620	.....
Obi	Uvalde	1,042	.....
O'Brien	Haskell	1,575	150
Ochiltree	Ochiltree	2,700	450
Odem	San Patricio	82	25
ODESSA	Ector	2,890	400
Odlaw	Kinney	1,102	.....
O'Donnell	Lynn	3,000	.....
Ogle	Lampasas	1,421	25
Oglesby	Coryell	846	283
Ohio	Cameron	45	.....
Oil City	Nacogdoches	224	.....
Oklaunion	Wilbarger	1,227	75
Otey	Brazoria	47	.....
Olden	Eastland	1,557	.....
Olive	Hardin	105	383
Olmito	Cameron	29	.....
Olmos	Maverick	767	.....
Olney	Young	1,184	1,095
Olton	Lamb	3,615	150
Olyphant	Baylor	1,429	.....
Omaha	Morris	399	750
Omega	Gregg	229	60
Onalaska	Polk	201	125
Onion Creek	Ellis	394	.....
Ontario	Oldham	3,994	.....
ORANGE	Orange	10	5,527
Orchard	Fort Bend	129	200
Orchard Park	Harrison	260	.....
Ore City	Upshur	211	.....
Oriana	Stonewall	1,809	25
Orphans Home	Navarro	484	.....
Orth	Young	1,282	.....
Osceola	Hill	716	325
Osman	Val Verde	1,554	.....
Ottine	Gonzales	342	200
Ovalo	Taylor	2,026	500
Overton	Rusk	507	675
Owego	Pecos	2,377	.....
Owens	Brown	1,467	.....
Oxford	Llano	1,333	.....
Oyster Creek	Brazoria	38	.....
Ozona	Crockett	2,500	427

Digitized by Google

Place.	County.	Elevation.	Population.
Paducah	Cottle	1,886	1,350
Pagoda	Trinity	290	.....
Paige	Bastrop	552	467
Paint Rock	Concho	1,640	800
Paisano	Presidio	5,078	148
Palacios	Matagorda	17	1,389
PALESTINE	Anderson	495	11,413*
Palm	Zavalla	587	.....
Palmer	Ellis	468	605
Paloma	Maverick	817	.....
PALO PINTO	Palo Pinto	1,000	.....
Pampa	Gray	3,234	300
Pandora	Wilson	455	.....
PANHANDLE	Carson	3,451	521
Papalote	Bee	89	134
Paradise	Wise	754	500
Paret	Nolan	2,088	.....
Park	Cherokee	349	.....
Parker	Johnson	815	64
Park Springs	Wise	958	200
PARIS	Lamar	565	12,081*
Parmerton	Parmer	4,125	.....
Parson	Kerr	1,619	.....
Parsons	Parker	1,170	.....
Parvin	Denton	420	44
Pasadena	Harris	35	75
Patton	Galveston	13	.....
Pattonville	Lamar	490	105
Pauline	Henderson	376	.....
Pavo	Kinney	1,042	.....
Paxton	Shelby	327	60
Peacock	Stonewall	1,882	500
Pearland	Brazoria	56	136
PEARSALL	Frio	646	1,799
Pecan Gap	Delta	566	625
PECOS	Reeves	2,580	1,856
Pelican	Liberty	156	25
Pena	Duval	550	.....
Pendell	Bosque	600	.....
Pendleton	Bell	736	210
Penick	Jones	1,643	.....
Pennell	Polk	215	.....
Perico	Dallam	4,374	.....
Perrin	Jack	1,050	.....
Perry	Falls	470	214
Personville	Limestone	416	103
Pescadito	Webb	588	.....
Petrolia	Clay	979	1,200
Pettibone	Milam	500	.....
Pettus	Bee	299	100
Petty	Lamar	605	375
Peveto	Orange	21	.....
Pflugerville	Travis	706	575
Pheasant	Matagorda	35	.....
Phelps	Walker	377	67
Phillips	Montgomery	392	.....
Pickens	Henderson	430	.....
Pickton	Hopkins	536	200

Digitized by Google

Place.	County.	Elevation.	Population.
Piedmont	Grimes	209	.....
Pierce	Wharton	109	65
Pierson	Gonzales	323	.....
Pilot Point	Denton	674	1,371
Pine	Camp	390	60
Pine Island	Angelina	182	.....
Pine Island	Jefferson	36	25
Pineland	Sabine	267	100
Pinery	Montgomery	250	.....
Pinkston	Navarro	446	50
Pinnacle	Upshur	436	.....
Pinto	Kinney	1,059	.....
Pioneer	Eastland	1,710	73
Pisek	Colorado	290	72
PITTSBURG	Camp	392	1,916
Placedo	Victoria	53	.....
Placid	McCulloch	1,600	50
Plains	Yoakum	3,300	125
Plainview	Hale	3,325	2,829
Piano	Collin	655	1,258
Plantersville	Grimes	325	207
Plasterco	Fisher	1,787	.....
Plateau	Culberson	3,936	25
Pleasanton	Atascosa	365	420
Pledger	Matagorda	68	150
Plemons	Hutchinson	2,800	100
Plover	Tarrant	710	.....
Plum	Fayette	309	182
Pocahontas	Montgomery	183	.....
Podo	Matagorda	61	.....
Poe	Angelina	187	.....
Poesta	Bee	246	.....
Point	Rains	523	325
Point Isabel	Cameron	8	249
Pollok	Angelina	316	200
Polvo	El Paso	3,653	.....
Polvo	Presidio	2,500	.....
Ponder	Denton	735	250
Ponetta	Johnson	753	.....
Ponta	Cherokee	282	175
Porfa	Hamilton	1,283	.....
Port Arthur	Jefferson	8	7,663
Port Boliver	Galveston	6	83
Porter	Lubbock	3,196	.....
Portland	San Patricio	31	182
PORT LAVACA	Calhoun	22	1,699
Port O'Connor	Calhoun	3	250
Posey	Lubbock	3,103	.....
POSTCITY	Garza	2,543	350
Poth	Wilson	401	175
Potomac	Polk	223	.....
Pottsboro	Grayson	761	313
Powderly	Lamar	464	63
Powell	Navarro	376	248
Powers	McLennan	485	.....
Poynor	Henderson	402	.....
Prague	Calhoun	12	.....
Prairie	Harris	87	.....

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Place.	County.	Elevation.	Population.
Prairie View	Waller	250	100
Presidio del Norte	Presidio	2,400	.....
Preston	Grayson	575	.....
Prestridge	Angelina	281	.....
Prices	Cherokee	292	.....
Priest's School	Hidalgo	107	.....
Primm	Fayette	312	25
Primrose	Tarrant	773	.....
Prince	McMullen	426	.....
Princeton	Collin	560	450
Pritchett	Upshur	409	250
Probst	Potter	3,408	.....
Proctor	Comanche	1,209	325
Prosper	Collin	647	500
Prosser	Angelina	314	.....
Providence	Robertson	265	.....
Pruett	Marion	392	.....
Pueblo	Callahan	1,440	.....
Pulliam	Tom Green	1,909	.....
Pulliam	Zavalla	815	.....
Pullman	Potter	3,599	.....
Pumpville	Val Verde	1,814	.....
Purdon	Navarro	394	220
Putnam	Callahan	1,592	450
Pyote	Ward	2,612	150
Pyron	Scurry	2,316	25
QUANAH	Hardeman	1,568	3,172
Quarry	Washington	285	62
Quebec	Presidio	4,625	.....
Queen City	Cass	349	388
Quihi	Medina	856	.....
Quinlan	Hunt	513	537
Quinn	Jasper	47	.....
QUITMAN	Wood	590	475
Quito	Ward	2,670	16
Rabbs	Lavaca	248	.....
Radium	Jones	1,692	.....
Ragland	Lamar	485	.....
Raisin	Victoria	109	120
Ralph	Randall	3,615	25
Ramsdell	Wheeler	2,515	100
Ramsey	Bastrop	220	.....
Randolph	Fannin	665	221
Randon	Fort Bend	112	.....
Ranger	Eastland	1,429	586
Rankin	Upton	2,494	.....
Ransom	San Augustine	457	.....
Ratcliff	Houston	338	500
Ravenna	Fannin	572	280
Ray	Grayson	796	.....
Rayburn	Liberty	157	80
Raymond	Leon	3,407	38
Raymondville	Cameron	30	300
Rayner	Colorado	173	.....
Rayville	Parker	234	.....
Raywood	Liberty	69	122

Digitized by Google

Place.	County.	Elevation.	Population.
Reagan	Falls	374	428
Reagor Springs	Ellis	493	.....
Realitos	Duval	464	84
Rebecca	San Augustine	334	.....
Redfield	Nacogdoches	388	.....
Redlawn	Cherokee	369	.....
Red Oak	Ellis	600	210
Redrock	Bastrop	483	300
Redwater	Bowie	286	260
Reedville	Caldwell	566	107
Reese	Cherokee	380	25
REFUGIO	Refugio	50	609
Rehm	Hartley	4,031	.....
Reinhardt	Dallas	546	87
Reklaw	Cherokee	292	25
Rendham	Baylor	1,297	.....
Renner	Collin	662	161
Reno	Lamar	546	.....
Resaca de la Palma	Cameron	27	.....
Reynolds	Nueces	168	.....
Reynolds	Shackelford	1,909	.....
Rhome	Wise	934	486
Ricardo	Nueces	53	25
Rice	Harris	61	.....
Rice	Navarro	470	325
Richards	Grimes	301	225
Richardson	Dallas	620	400
Richland	Navarro	377	.....
Richland Springs	San Saba	1,377	475
RICHMOND	Fort Bend	104	1,371
Ricker	Brown	1,375	.....
Ridgeway	Hopkins	548	110
Riesel	McLennan	474	575
Ringgold	Montague	890	500
Rio Grande	El Paso	3,462	.....
Rio Hondo	Cameron	21	.....
Rio Vista	Johnson	745	375
Ripley	Titus	380	54
Rising Star	Eastland	1,630	640
Ritchie	McLennan	708	.....
Riverside	Bexar	606	.....
Riverside	Walker	169	128
Riverton	Reeves	2,712	.....
Riviera	Nueces	41	250
Roanoke	Denton	648	364
Roaring Springs	Motley	2,520	.....
Robards	Bexar	815	.....
Robbins	Leon	527	.....
Roberts	Hunt	495	.....
Robstown	Nueces	40	275
Robtin	Hamilton	1,095	.....
Roby	Fisher	1,800	712
Rochelle	McCulloch	1,770	275
Rochester	Haskell	1,592	375
Rock Creek	Parker	892	860
Rock Crusher	Coleman	1,947	.....
Rockdale	Milam	462	2,073
Rock Island	Colorado	251	36

Digitized by Google

Place.	County.	Elevation.	Population.
Rockland	Tyler	128	305
Rockledge	Donley	3,117	.....
ROCKPORT	Aransas	6	1,382
Rock Springs	Edwards	2,400	.....
ROCKWALL	Rockwall	552	1,136
Rodgers	Upshur	539	.....
Roganville	Jasper	191	200
Rogers	Bell	62	1,275
Roll Over	Galveston	13	.....
Romero	Hartley	4,101	25
Rona	Val Verde	1,626	.....
Rosanky	Bastrop	508	117
Roscoe	Nolan	2,380	1,400
Rosebud	Falls	392	1,472
Rosedale	Jefferson	32	25
Rosenberg	Fort Bend	106	1,198
Rosenfeld	Brewster	3,660	.....
Rosharon	Brazoria	55	.....
Ross	McLennan	575	60
Rosser	Kaufman	396	128
Rossyln	Harris	106	.....
Rotan	Fisher	579	1,126
Round Mountain	Blanco	1,255	158
Round Rock	Williamson	709	1,138
Roundup	Hockley	3,334	.....
Rowe	Donley	2,654	.....
Rowena	Runnels	1,750	525
Rowlett	Dallas	509	108
Royal	Potter	3,548	.....
Roxton	Lamar	506	750
Royse City	Rockwall	554	1,210
Royston	Fisher	1,920	200
Ruby	Karnes	316	.....
Rudolph	Willacy	28	.....
Rugby	Red River	415	.....
Rugeley	Matagorda	35	.....
Ruidosa	Presidio	2,800	.....
Rule	Haskell	1,672	891
Ruliff	Newton	24	32
Runge	Karnes	304	1,100
RUSK	Cherokee	489	1,558
Russellville	Motley	2,395	.....
Rutland	Angelina	241	.....
Rutledge	Williamson	935	21
Ryan	Presidio	4,750	.....
Rye	Liberty	123	.....
Rylie	Dallas	463	17
Sabinal	Uvalde	956	1,640
Sabine	Jefferson	17	673
Sable	San Augustine	227	.....
Sachse	Dallas	555	81
Sacul	Nacogdoches	307	300
Sage	Burnet	1,261	242
Sager	Haskell	1,621	.....
Sagerton	Haskell	1,641	400
Saginaw	Tarrant	724	83
St. Edward's College	Travis	600	.....

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Place.	County.	Elevation.	Population.
St. Francis	Potter	3,581	.....
St. Jo	Montague	1,146	822
Salesville	Palo Pinto	1,018	82
Saltillo	Hopkins	454	220
Sam Fordyce	Hidalgo	133	125
Sample	Gonzales	291	25
SAN ANGELO	Tom Green	1,847	10,321
SAN ANTONIO	Bexar	656	115,065*
SAN AUGUSTINE	San Augustine	304	1,204
San Benito	Cameron	35	925
San Carlos	Presidio	4,000	.....
SANDERSON	Terrell	2,775	450
Sand Hills	Ward	2,702	.....
SAN DIEGO	Duval	312	1,897
Sand Lake	Ellis	370	.....
Sandstone Spur	Burnet	980	.....
Sandune	Liberty	43	.....
Sandy Fork	Gonzales	366	.....
Sandy Point	Brazoria	58	189
San Elizario	El Paso	3,628	834
Sanger	Denton	666	950
San Jose	Bexar	635	.....
San Leon	Galveston	14	125
SAN MARCOS	Hays	581	4,071
San Martine	Reeves	3,714	.....
SAN SABA	San Saba	1,705	1,200
San Saba Camp	San Saba	1,687	.....
Santa Anna	Coleman	1,743	1,453
Santa Maria	Cameron	58	120
Santo	Palo Pinto	816	500
Saratoga	Hardin	86	550
Sarber	Marion	313	.....
Sardis	Ellis	589	.....
Sarita	Willacy	38	.....
Saron	Trinity	285	.....
Sartartia	Fort Bend	82	.....
Saspamco	Wilson	482	125
Satsuma	Harris	120	.....
Satuit	McCulloch	1,692	.....
Saunders	Travis	770	.....
Savoy	Fannin	664	328
Sayers	Bexar	415	35
Schenck	Grayson	760	.....
Schertz	Guadalupe	713	200
Schofield	Hill	656	.....
Schulenburg	Fayette	344	1,091
Schwertner	Williamson	387	.....
Scotland	Archer	991	175
Scofield	Burleson	230	.....
Scottsville	Harrison	390	49
Scroggins	Franklin	359	35
Scurry	Kaufman	468	200
Seabrook	Harris	15	250
Seadrift	Calhoun	7	50
Seago	Dallas	451	.....
Sealy	Austin	203	1,225
Sebastian	Cameron	36	.....

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Place.	County.	Elevation.	Population.
Seco	Medina	1,066	.....
Security	Montgomery	160	.....
Sedwick	Shackelford	1,365	.....
SEGUIN	Guadalupe	553	3,116
Selby	McLennan	441	.....
Sellman	McCulloch	1,714	.....
Seminary Hill	Tarrant	760	.....
Seneca	Tyler	243	.....
Sequoyah	Trinity	333	.....
Sequoyah Junction	Trinity	345	.....
Serbin	Lee	481	83
Settegast	Harris	60	.....
Sevilla	Brown	1,343	.....
Seymour	Baylor	1,290	3,500
Shafter	Presidio	3,900	.....
Shamrock	Wheeler	2,281	725
Shanghai	Wharton	109	.....
Sharon	Hardin	41	.....
Shaufler	Nolan	2,184	.....
Shavano	Bexar	937	.....
Shawnee	Angelina	241	.....
Sheldon	Harris	48	25
Shepherd	San Jacinto	143	278
SHERMAN	Grayson	720	13,157*
Sherman Junction	Grayson	742	.....
SHERWOOD	Irion	2,145	339
Shiner	Lavaca	350	1,096
Shiro	Grimes	373	325
Shockley	Hamilton	1,043	.....
Shumla	Val Verde	1,412	.....
Sierra Blanca	El Paso	4,509	150
Silas	Shelby	360	.....
Silenus	Bell	597	.....
Silsbee	Hardin	81	300
Silver Lake	Van Zandt	383	29
Silverton	Briscoe	3,300	525
Silver Valley	Coleman	2,034	250
Simms	Bowie	270	47
Simonds	Dallas	432	16
Simonton	Fort Bend	117	35
Simpsonville	Matagorda	22	.....
Singleton	Grimes	339	60
SINTON	San Patricio	49	975
Sipe Springs	Comanche	1,409	377
Skeen	Lynn	2,975	.....
Skidmore	Bee	159	450
Slaton	Lubbock	3,040	.....
Slayden	Gonzales	329	104
Small	El Paso	4,116	.....
Smiley	Gonzales	316	400
Smith	Upshur	300	.....
Smithfield	Tarrant	639	137
Smithville	Bastrop	324	3,167
Smithwick	Burnet	727	47
SNYDER	Scurry	2,310	2,514
Solms	Comal	627	37
Somerville	Burleson	250	950
Sommer	Cottle	1,680	.....

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Place.	County.	Elevation.	Population.
Sonora	Sutton	2,020	783
Soncy	Potter	3,690	.....
Sour Lake	Hardin	43	800
Southard	Donley	2,916	.....
South Bosque	McLennan	480	89
Southland	Garza	2,975	.....
Southmayd	Grayson	735	132
Southern Pacific Jct.	Bexar	667	.....
Sparks	Bell	470	.....
Sparta	Bell	811	48
Sperry	Grayson	760	.....
Spies	Fannin	547	.....
Spindle Top	Jefferson	30	.....
Spofford	Kinney	1,008	79
Spohn	Nueces	48	.....
Spring	Harris	126	550
Springdale	Cass	239	68
Springtown	Parker	900	.....
Sprinkle	Travis	601	50
Spur	Dickens	2,274	1,360
Stafford	Fort Bend	82	57
Stalls	Marion	220	.....
Stamford	Jones	1,603	3,902
Standart	Kinney	1,085	40
Stanton	Martin	2,654	1,100
Stateline	El Paso	2,892	.....
Stayton	Cherokee	712	.....
Stella	Harris	52	.....
Stephenson	Cass	475	.....
STEPHENVILLE	Erath	1,283	2,561
Sterling City	Sterling	2,295	532
Sterrett	Ellis	630	28
Stevens	Sherman	3,535	.....
Stilson	Liberty	74	28
Stockard	Henderson	421	22
Stockdale	Wilson	430	725
Stockman	Shelby	325	27
Stone	Washington	598	19
Stoneburg	Montague	934	173
Stone City	Brazos	250	42
Stoneham	Grimes	388	100
Stowell	Chambers	22	176
Strain	Hardin	68	.....
Strang	Harris	34	.....
STRATFORD	Sherman	3,690	510
Strawn	Palo Pinto	992	612
Streetman	Freestone	364	300
Strobel	Brewster	4,489	.....
Stryker	Polk	205	125
Sublime	Lavaca	222	210
Sudduth	Burnet	1,135	.....
Sugarland	Cameron	15	200
Sugarland	Fort Bend	84	200
Sugar Valley	Matagorda	52	.....
Suggs	Irion	2,469	.....
Sulphur	Bowie	237	.....
SULPHUR SPRINGS	Hopkins	494	5,151

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Place.	County.	Elevation.	Population.
Summerfield	Castro	3,926	.....
Summit	Burnet	1,491	.....
Summit	Milam	514	.....
Sunny Lane	Burnet	1,169	15
Sunset	Montague	992	632
Sutherland Springs	Wilson	423	550
Sutton	Robertson	370	.....
Swanson	Harris	189	.....
Swastika	Hale	3,460	.....
Swearingen	Cottle	1,755	.....
Sweden	Duval	444	.....
Sweeny	Brazoria	38	.....
Sweet Home	Lavaca	286	274
SWEETWATER	Nolan	2,164	4,176
Swenson	Fort Bend	117	.....
Sylvester	Fisher	1,838	300
Taber	Brewster	3,860	.....
TAHOKA	Lynn	3,043	575
Talco	Titus	358	.....
Tallys	Harrison	241	25
Talpa	Coleman	1,950	425
Tanglewood	Lee	476	97
Tascosa	Oldham	3,176	192
Tatum	Rusk	294	425
Tavener	Fort Bend	117	.....
Taylor	Williamson	544	5,314
Teague	Freestone	497	3,288
Tecific	Nolan	2,031	.....
Tehuacana	Limestone	575	382
Telferer	Victoria	96	200
Temple	Bell	692	12,704*
Tenaha	Shelby	351	491
Tennyson	Coke	1,875	100
Terlingua	Brewster	3,272	.....
Terrell	Kaufman	530	7,050
Terry	Orange	19	73
Tesnus	Brewster	3,725	.....
Texarkana	Bowie	295	11,722*
Texas City Jct.	Galveston	8	.....
Texla	Orange	31	50
Texline	Dallam	4,694	350
Texola	Wheeler	2,148	.....
Thatcher	Montague	442	.....
Thomaston	DeWitt	160	347
Thompsons	Fort Bend	68	104
Thorndale	Milam	460	1,100
Thornton	Limestone	496	678
Throckmorton	Throckmorton	1,700	500
Thurber	Erath	1,200	3,000
Thurston	Terrell	1,906	.....
Tidehaven	Matagorda	35	.....
Tiffin	Eastland	1,400	.....
Timber	Montgomery	184	80
Timpson	Shelby	394	1,528
Tisdale	Bexar	600	.....
Tiocano	Cameron	50	.....
Tioga	Grayson	663	950

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Place.	County.	Elevation.	Population.
Titley	Brewster	4,064	.....
Tokio	McLennan	578	.....
Tolan	Taylor	2,063	.....
Tolar	Hood	1,013	455
Tolbert	Wilbarger	1,292	135
Tomball	Harris	212	275
Tom Bean	Grayson	816	288
Tomlin	Bastrop	534	.....
Tona	Kaufman	519	43
Torbert	El Paso	4,346	.....
Torcer	El Paso	4,272	.....
Tornillo	El Paso	3,583	.....
Toronto	Brewster	4,730	.....
Torrans	Marion	395	.....
Tow	Llano	1,025	39
Towne	El Paso	3,720	.....
Toyah	Reeves	2,909	1,052
Trabue	Shelby	265	.....
Travis	Falls	455	148
Trawick	Nacogdoches	438	160
Trent	Taylor	1,914	400
Trenton	Fannin	754	550
Trice	Trinity	279	.....
Trickham	Coleman	1,400	.....
Trinidad	Henderson	304	75
Trinity	Kaufman	357	.....
Trinity	Trinity	226	856
Trinity Mills	Dallas	559	64
Troupe	Smith	467	1,126
Troy	Bell	680	300
Trueloves	Johnson	734	.....
Trumbull	Ellis	463	98
Tubbe	Nacogdoches	185	.....
Tuggle	Burnet	960	.....
Tulane	Orange	14	.....
TULIA	Swisher	3,447	1,216
Tumlinson	Burnet	1,265	.....
Tuna	LaSalle	553	.....
Turcotte	Willacy	38	.....
Turney	Cherokee	409	100
Turpentine	Jasper	190	25
Tuscola	Taylor	2,020	49
Tuxedo	Jones	1,662	200
Twist	Hartley	3,969	.....
Twohig	LaSalle	457	.....
Tye	Taylor	1,795	400
TYLER	Smith	521	11,393*
Ulmer	Grimes	287	.....
Umbarger	Randall	3,746	100
Upton	Bastrop	342	59
Urbana	San Jacinto	97	.....
Uvalde	Uvalde	937	3,998
Vair	Angelina	176	.....
Valentine	Jeff Davis	4,421	175
Valera	Coleman	1,790	225
Valley Junction	Robertson	285	.....

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Place.	County.	Elevation.	Population.
Valley Mills	Bosque	630	708
Valley View	Cooke	714	575
Van Alstyne	Grayson	791	1,411
VAN HORN	Culberson	4,010	175
Van Raub	Bexar	1,371	60
Van Vleck	Matagorda	48	200
Van Zandt	Tarrant	782	.....
Vega	Oldham	3,984	275
Venable	San Augustine	371	.....
Ventura	Harris	212	.....
Venus	Johnson	658	405
Verhelle	DeWitt	164	.....
VERNON	Wilbarger	1,205	3,195
Viaduct	Val Verde	1,550	.....
VICTORIA	Victoria	93	3,673
Vida	Tyler	230	.....
Vidor	Orange	26	25
View	Taylor	1,958	.....
Village Mills	Hardin	102	316
Vim	Nacogdoches	295	.....
Vineyard	Jack	934	250
Vinton	El Paso	3,773	25
Viola	Nueces	17	.....
Virginia Point	Galveston	5	.....
Vista	Hamilton	2,381	.....
Viterbo	Jefferson	16	.....
Viva	Bexar	1,091	.....
Van Ormy	Bexar	626	42
Votaw	Hardin	137	100
Voth	Jefferson	21	125
WACO	McLennan	414	28,707*
Wadsworth	Matagorda	34	60
Waelder	Gonzales	367	694
Waldo	McLennan	1,008	51
Waller	Waller	250	383
Walley	Harris	68	.....
Wallis Station	Austin	132	675
Walnut Springs	Bosque	910	1,340
Walton	Clay	861	.....
Wantmore Jct.	Dallas	433	.....
Waples	Hood	841	80
Ware	Comanche	4,214	.....
Warfield	Midland	2,860	.....
Waring	Kendall	1,359	92
Warren	Tyler	147	833
Warsaw	San Augustine	151	.....
Warwick	Brewster	4,067	.....
Washburn	Armstrong	3,526	150
Washer	Zavalla	829	.....
Waskom	Harrison	297	207
Wastella	Nolan	2,396	75
Watauga	Tarrant	606	58
Waterman	Shelby	276	476
Water Valley	Tom Green	2,108	132
Watkins	Terrell	1,718	.....
Watson	Comanche	1,684	.....
Watters	Travis	707	68

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Place.	County.	Elevation.	Population.
Waukegan	Montgomery	188	.....
Waverly	Walker	365	232
WAXAHACHIE	Ellis	530	6,205
WEATHERFORD	Parker	1,000	5,074
Weaver	Hopkins	435	79
Webb	Tarrant	934	.....
Webb	Webb	647	.....
Webberville	Travis	400	.....
Webster	Harris	27	33
Weimar	Colorado	408	906
Weinert	Haskell	1,531	500
Weir	Williamson	694	175
Weldon	Houston	312	139
Welfare	Kendall	1,399	27
Wellborn	Brazos	318	150
Wellington	Collingsworth	1,980	.....
Wells	Cherokee	334	162
Wells	Jack	1,083	.....
Welview	Coleman	1,874	.....
Wendell	Jeff Davis	4,221	.....
West	McLennan	648	1,645
West Brook	Mitchell	2,127	375
Westbury	Jefferson	40	.....
Westcott	San Jacinto	169	.....
Westfield	Harris	114	48
Westhoff	DeWitt	260	425
West Livingston	Polk	220	.....
Westover	Baylor	1,286	.....
West Point	Fayette	298	289
West Pt. Arthur	Jefferson	8	.....
Wetmore	Bexar	816	16
WHARTON	Wharton	111	1,505
Wheatland	Dallas	1,290	87
Wheeler	Wheeler	2,300	200
White	Wilbarger	1,186	.....
White City	San Augustine	192	.....
White Deer	Carson	3,338	50
Whitehouse	Smith	483	150
Whiteland	McCulloch	1,780	.....
White Oak	Hopkins	393	.....
Whitesboro	Grayson	783	1,219
Whites Ranch	Chambers	8	.....
Whitewright	Grayson	744	156
Whitney	Hill	585	4,678
Whitsett	Live Oak	208	.....
WICHITA FALLS	Wichita	946	10,760*
Wild Horse	Culberson	3,844	.....
Wildorado	Oldham	3,883	200
Wiles	Stephens	1,155	.....
Wilkie	Burnet	1,281	.....
Wilkins	Upshur	318	.....
Willard	Trinity	297	.....
Willis	Montgomery	381	832
Willow Springs	Gregg	368	.....
Wills Point	Van Zandt	532	1,398
Wilmer	Dallas	472	200
Wilsey	Parmer	4,123	.....
Wilson	Lynn	3,073	.....

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Place.	County.	Elevation.	Population.
Winchell	Brown	1,329	300
Winchester	Fayette	338	375
Windom	Angelina	178	.....
Windom	Fannin	694	312
Windsor	Cooke	836	.....
Winfield	Titus	446	625
Winnie	Chambers	27	25
Winnsboro	Wood	523	1,741
Winona	Smith	317	550
Winters	Runnels	1,846	1,347
Withers	Bexar	632	.....
Woden	Nacogdoches	244	.....
Wofford	Henderson	390	.....
Wolfe City	Hunt	674	1,402
Wood	Grimes	220	.....
Woodbine	Cooke	762	113
Woodlawn	Harrison	305	104
Woodsboro	Refugio	49	325
WOODVILLE	Tyler	232	650
Woodward	LaSalle	508	20
Wooland	Tom Green	1,993	.....
Wortham	Freestone	478	899
Wurtzbaugh	Harrison	202	.....
Wyatt	Ellis	624	44
Wylie	Collin	557	620
Yarboro	Grimes	416	83
Yarnall	Carson	3,478	.....
Yellowhouse	Lamb	3,401	.....
Yoakum	DeWitt	322	4,657
Yorktown	DeWitt	255	1,180
Ysleta	El Paso	3,652	1,562
Yturria	Cameron	40	.....
Yucca	Uvalde	368	.....
Zacate	Zavalla	695	.....
Zavalla	Angelina	228	175
Zella	McMullen	382	.....
Zephyr	Brown	1,505	350
Zillah	Victoria	46	.....
Zita	Randall	3,605	.....
Zulch	Madison	359	100

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CHAPTER VIII.

LOCATION AND ELEVATION OF MOUNTAIN RANGES, PEAKS AND HILLS.

In the region west of the Pecos river there are 78 peaks above 5,000 feet in elevation; 35 peaks above 6,000 feet, 10 peaks above 7,000 feet, and 2 above 8,000 feet. In Jeff Davis county (area 2,263 square miles) there are 14 peaks above 5,000 feet in elevation.

The highest point in the state appears to be El Capitan Peak, Guadalupe Mountains, Culberson county, 8,690 feet; Baldy Peak, Jeff Davis county, being second with 8,382 feet.

Place.	County.	Elevation.
Adobe Walls	Brewster	3,313
Aguja Peak	Jeff Davis	5,981
Aguja Peak, Little	Jef Davis	5,300
Alto Relex	Brewster	4,017
Anacacho Mountains	Kinney	1,517
Anderson Mountain	Coryell	1,250
Antelope Hill	Coryell	1,000
Antelope Hills	Shackelford	1,500
Anthony's Nose	El Paso	6,906
Apache Peak	Culberson	5,696
Asphalt Mountain	Uvalde	1,300
Babyhead Mountain	Llano	1,521
Bachelor Peak	Llano	1,350
Backbone Mountain	Burnet	1,200
Bald Knob	Burnet	1,300
Bald Mountain	Burnet	1,239
Bald Mountain	Stephens	1,450
Bald Mountain	Travis	1,250
Baldy Mountain	Burnet	1,325
Baldy Peak	Jeff Davis	8,382
Barber Mountain	Palo Pinto	1,050
Barilla Spring	Reeves and Pecos	3,900
Barilla Mountains	Jeff Davis	5,560
Baringer Hill	Burnet	1,000
Barnard Knob	Hood	900
Batesville Hill	Zavalla	964
Baylor Mountains	Culberson	5,560
Bead Mountain	Coleman	2,000
Bee Mountain	Bosque	1,100
Bee Mountain	Brewster	3,376
Bell Mountain	Brewster	3,460
Bell Mountain	Gillespie	1,750
Berry Knob	Johnson	1,000
Big Aguja Mountain	Jeff Davis	5,743
Big Mountain	Uvalde	1,150
Bill Black Peak	San Saba	1,750
Black Hill	Bexar	760

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Place.	County.	Elevation.
Black Hills	Presidio	5,500
Black Knob	Brewster	2,617
Black Mesa	Brewster	4,000
Black Mountain	Brewster	4,290
Black Mountain	Jeff Davis	7,550
Black Mountain	Uvalde	1,277
Blue Mound	Montague	1,250
Blue Mound	Tarrant	850
Blue Mountain	Jeff Davis	7,330
Blue Mountains	Mason	2,217
Blue Mountain	Uvalde	1,277
Blue Range	Brewster	5,055
Bodie Peak	Mason	1,600
Boracho Peak	Jeff Davis	5,661
Boultinghouse Mountain	Burnet	1,350
Brady Mountains	Concho	2,100
Brady Mountains	McCulloch	2,000
Bread Tray Mountain	Coryell	750
Browns Mountain	Stephens	1,250
Brushy Knob	Hill	800
Brushy Knob	Johnson	900
Brushy Knob	Tom Green	2,250
Brushy Mound	Cooke and Grayson	800
Brushy Mountain	Erath	1,250
Buck Mountain	Stephens	1,250
Buffalo Peak	Blanco	1,650
Bullhead Mountain	Edwards	2,050
Bunker Hill	Burnet	1,550
Bunker Hill	San Saba and Llano	1,500
Burkett Mound	Lavaca	500
Burro Mesa	Brewster	4,400
Burton Knob	Parker	1,000
Buzzard Roost	Burnet	1,450
Caddo Peak	Johnson	1,000
Caldwell Knob	Bastrop	575
Calf Hill	Bexar	760
Camp San Saba, San Saba river	Mason	1,687
Cap Mountain	Llano	1,376
Capote Peak	Presidio	6,185
Casket Mountain	Jeff Davis	6,180
Castle Hill	Bell	1,000
Castle Peak	Lampasas	1,552
Castle Peak	Taylor	2,500
Cathedral Mountain	Brewster	6,860
Cedar Hill	Travis and Hayes	1,175
Cedar Knob	Edwards	2,360
Cedar Knob	Kimble	2,200
Cedar Knob	Somervell	1,250
Cedar Mountain	Bosque	1,000
Cedar Mountain	Burnet	1,350
Cedar Mountain	Coke	1,950
Cedar Mountain	Eastland	1,600
Cedar Top Peak	Lampasas	1,500
Cerro Alto (Hueco Mts.)	El Paso	5,767
Cerro Castellan	Brewster	3,283
Cerro Diablo	El Paso	5,700

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Place.	County.	Elevation.
Chalk Bluff	Uvalde	1,350
Chalk Knob	Burnet	1,200
Chalk Mountain	Erath	1,000
Chilicotal Mountain	Brewster	4,104
Chimneys, The	Brewster	2,900
Chinati Peak	Presidio	7,730
Chispa Mountain	Culberson	5,215
Christmas Mountains	Brewster	5,735
Church Mountain	Nolan	2,300
Cienega Mountain	Presidio	5,227
Cienega Mountain	Brewster	6,550
Cigar Mountain	Brewster	3,290
C. J. Mountain	Stephens	1,450
Cleveland Breaks	Presidio	5,500
Click Gap	Llano	1,393
Cline Peak	Uvalde	1,517
Comanche Peak	Hood	1,200
Concan	Uvalde	1,252
Conception Mission	Bexar	590
Contrabando Mountain	Brewster	2,684
Coon Mountain	Brown	1,700
Corazones Peaks	Brewster	5,306
Croton Peak	Brewster	4,600
Crossville Peak	Bell	1,150
Crown Mountain	Brewster	7,186
Cuesta del Burro	Presidio	5,750
Culebra Hill	Bexar	1,146
Cutoff Mountain	Hamilton	1,250
Dalton Mountain	Coryell	750
Dancer Peak	Llano	1,686
Delaware Mountains	Culberson	5,870
Devil Ridge (northern part)	El Paso	5,550
Devils Courthouse Peak	Tom Green	2,250
Dogie Mountain	Brewster	3,700
Dome Peak	El Paso	5,400
Double Mountain	Stephens	1,550
Douglas Mountains	Bell	1,100
Dunman Mountain	Llano	1,250
Dye Mounds	Montague	1,236
Eagle Mountain	El Paso	7,510
EL CAPITAN PEAK, GUADALUPE MOUNTAINS. HIGHEST POINT IN STATE	Culberson	8,690
Elephant Mountain	Brewster	6,200
Ellenburger Hills	San Saba	1,525
Elm Mountain	Kinney	1,449
Emory Peak	Brewster	7,835
Enchanted Rock	Llano	1,815
Evensville Peak	Stephens	1,250
Finlay Mountains	El Paso	5,700
Flat Top Mountain	Bosque	1,000
Flat Top Mountain	Eastland	1,650
Flat Top Peak	Jones and Stonewall	1,798
Flat Top Peak	Lampasas	1,541
Fossil Knobs	Brewster	3,000

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Place.	County.	Elevation.
Frenchman Hills	Presidio	5,250
Fresno Peak	Presidio	5,131
Gettysburg Peak	Presidio	4,897
Goat Mountain	Brewster	6,700
Grapevine Hills	Brewster	3,859
Green Mountain	Burnet	1,500
Green Mountain	Uvalde	1,400
Green Mountains	Shackelford	1,500
Gunsight Mountain	Eastland	1,550
Hackett Peak	El Paso	5,280
Harkey Knobs	San Saba	1,500
Harriet Mountain	Erath	1,250
Harris Peak	Palo Pinto	1,250
Hayes Ridge	Brewster	4,600
Hayrick Mountain	Coke	2,000
Hen Egg Mountain	Brewster	5,002
Henson Mountain	Coryell	1,000
Hog Mountains	Brown	1,900
Hog Mountain	Coryell	1,250
Hog Mountain	Runnels	2,000
Hog Mountain	Stephens	1,350
Hondo Pass, summit	Medina	1,092
Hoover Knobs	Hamilton	1,500
House Mountain	Llano	1,853
Horse Mountain	Llano	1,450
Hot Springs	El Paso	3,300
Hubert Ridge	Brewster	3,940
Hueco Mountains	El Paso	Cf. Cerro Alto
Hueco Tanks	El Paso	4,500
Indian Hills	San Saba	1,650
Indian Knob	Parker	1,200
Indian Knoll	Stephens	1,350
Indian Mountain	Brown	1,600
Indian Mountain	Burnet	1,450
Indian Mountain	Comanche	1,650
Indian Mountain	Edwards	2,114
Indianola Peak	Brewster	5,240
Inge Mountain	Uvalde	1,000
Ivy Mountains	Bell	1,100
Jackson Knob	Coryell	1,050
Johnson Peak	Bosque	1,250
Kinchelo Peak	Lampasas	1,433
Kit Mountain	Brewster	3,803
Kyle Mountain	Palo Pinto	1,350
Langford Mountain	Coryell	850
Las Moras Mountain	Kinney	1,667
Leon Mountain	Brewster	3,000
Lion Mountain	Burnet	1,275
Little Twin Sister Peaks	Hays	1,250
Lockhart Mountain	Llano	1,438
Lone Grove	Llano	999
Lone Man Mountain	Hays	1,450
Lone Woman Mountain	Hays	1,450

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Place.	County.	Elevation.
Lone Mountain	Brewster	4,132
Lone Mountain	Erath	1,350
Lone Mountain	Hamilton	1,300
Lone Mountain	Llano	1,525
Lone Oak Mountain	Llano	1,850
Lone Tree	Travis	975
Lone Tree Hill	Zavalla	875
Long Mountain	Coryell	1,300
Long Mountain	Llano	1,400
Lookout Mountain	McCulloch	1,500
Lopez Peaks	Irion	2,500
Lost Mine Peak	Brewster	7,550
Lotman Hill	Bastrop	400
McAdams Peak	Palo Pinto	1,250
McCathrine Mountain	Shackelford	1,250
McCracken Mound	Montague	1,000
McMillan Mountains	Bell	1,100
McQuirt	Eastland	1,250
Magill Mountain	Llano	1,700
Major Peak	Jeff Davis	5,822
Malone Mountains	El Paso	5,050
Manere Mountain	Bell	1,150
Marble Peak	Culberson	5,185
Margaret Peak	Coke	2,300
Mariscal Mountain	Brewster	3,940
Marley Peaks	San Saba	1,550
Marshall's Bluff	Grayson	700
Maverick Mountain	Brewster	3,495
Miller Mountain	Bell	900
Mitre Peak	Jeff Davis	6,100
Monument Peak	Fisher	2,000
Mount Barker	Travis	800
Mount Bonnell	Travis	750
Mount Connor	Shackelford	1,750
Mount Franklin, north peak	El Paso	5,591
South peak	El Paso	7,140
Mount Hudson	Gillespie	1,750
Mount Moro	Taylor	2,416
Mount Nebo	Gillespie	1,750
Mount Ord	Brewster	6,800
Mount Taylor	Lampasas	1,250
Muerto Peak	Jeff Davis	6,749
Mule Ear Peaks	Brewster	3,880
Musquiz Canyon	Jeff Davis	4,500
Nebo Mountain	Parker	1,000
Niggerhead Peak	Burnet	1,313
Niggerhead	Travis	1,300
Nipple Peak (southern part)	Coke	2,200
Nipple Peak	Coke	2,400
Norman Hill	Bosque	1,000
Nubbin Ridge	Cooke	1,000
Nugent Mountain	Brewster	4,783
Oak Hills	Presidio	5,250
Obar Hill	Fayette	600
Obi Hill	Uvalde	1,150

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Place.	County.	Elevation.
Pack Saddle Mountain	Llano	1,664
Padrone Hill	Bexar	904
Paint Gap Hills	Brewster	4,258
Paisano Peak	Brewster	6.050
Peloncillo Peak	Kinney	1,000
Phantom Lake	Jeff Davis	3,450
Phillips Rock	Llano	1,500
Pike Peak	Edwards	1,905
Pilot Knob	Bosque	1,000
Pilot Knob	Erath	1,200
Pilot Knob (east of McNeil)	Travis	900
Pilot Knob (south of Austin)	Travis	700
Pinoak Mound	Gonzales	350
Pinks Peak	Brewster	3,681
Pinto Mountain	Kinney	1,551
Point Peak	Llano	1,450
Pompey Mountains	Mills	1,600
Post Mountain	Burnet	1,556
Postoak Ridge	Travis	1,325
Potato Top Peak	Burnet	1,570
Potato Hill	Comanche	1,750
Potter's Peak	Lampasas	1,500
Powelldale Mountains	Bosque	750
Puertacitas Mountains	Presidio	6,300
Pulliam Bluff	Brewster	6,921
Pummel Peak	Brewster	6,630
Pyramid Rock	Llano	1,747
Quitman Mountains	El Paso	6,600
Rattlesnake Mountain	Eastland	1,600
Riley Mountain	Llano	1,600
Robinson Peak	Coleman	2,000
Rock Hut	Brewster	3,540
Round Head	Gillespie	1,800
Round Hill	Shackelford	1,500
Round Mountain	Montague	1,150
Round Mountain	San Saba	1,835
Round Mountain	Travis	1,000
Round Mountain	Uvalde	1,077
Round Mountain	Blanco	1,600
Round Mountain	Comanche	1,750
Round Mountain	Coryell	1,000
Round Mountain (N. E. of Eastland)	Eastland	1,350
Round Mountain (S. E. of Eastland)	Eastland	1,500
Round Mountain	El Paso	5,100
Round Mountain	Uvalde	1,600
Rosillos Mountains	Brewster	4,634
Roys Peak	Brewster	3,935
Royston Hill	Bastrop	575
Russell Hill	Gonzales	500
Salmon Peak	Kinney	1,940
Salt Mountain	Brown	1,750
San Antonio Mountain	El Paso	7,020

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Place.	County.	Elevation.
Sand Mountain	Zavalla	868
Sandstone Mountain	Llano	1,460
Sandy Mountain	Llano	1,068
San Jose Mission	Bexar	590
San Juan Mission	Bexar	542
San Saba Peak	Mills	1,712
Santa Anna Mountains	Coleman	2,000
Sawmill Mountain	Brewster	3,795
Sawtooth Mountain	Jeff Davis	7,748
Schaefer Hill	Bastrop	575
Seep Springs Mountain	Edwards	2,280
Seven Knobs	Somervell and Bosque	1,00(
Shackfield Hill	Uvalde	1,00(
Sharp Mountain	Llano	1,63:
Sheep Peak	El Paso	6,05b
Shell Mountain	Coryell	1,000
Shingle Hills	Travis	1,450
Shin Oak Mountain	San Saba	1,925
Shoe Peg Mountain	Uvalde	1,740
Shovel Mountain	Blanco	1,500
Sierra Aguja	Brewster	3,281
Sierra Blanca	El Paso	6,950
Sierra del Caballo Muerto	Brewster	5,630
Sierra Diablo	El Paso	6,100
Sierra Larga	Brewster	3,126
Sierra Prieta	El Paso	5,450
Sierra Tinaja Pinta	El Paso	5,500
Sierra Vieja Mountains	Presidio	6,000
Skeen Peak	Wise	1,350
Slaughter Mountain	Burnet	1,150
Slickrock Mountain	Brewster	4,001
Solitario Peak	Presidio	4,800
Smoothing Iron Mountain	Llano	1,833
Spanish Pass	Kendall	1,637
Speck Mountain	Coleman	1,550
Spy Mountain	Stephens	1,250
Star Mountain	Brown	1,900
Star Mountain	Hamilton	1,600
Star Mountain	Jeff Davis	6,356
Steal Easy Mountain	Stephens	1,50(
Steamboat Mountain	Kimble	2,00(
Study Butte	Brewster	2,835
Sue Peaks	Brewster	5,857
Sugar Loaf Mountain	Bosque	1,000
Sugar Loaf Mountain	Coryell	950
Sulphur Mountain	Uvalde	1,124
Summit of Iron Ore Knobs	Grayson	900
Tabernacle Mountain	El Paso	5,650
Talley Mountain	Brewster	3,800
Tallowface Mountain	Eastland	1,250
Taylor Hills	Uvalde	1,000
Tepee Butte	El Paso	5,173
Texas Hill	Bastrop	611
Threemile Mountain	Culberson	4,845
Three Mounds	Cooke	950
Timber Mountain	Jeff Davis	6,442

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Place.	County.	Elevation.
Tod Mountain	Mason	1,695
Tom Nunn Hill	Uvalde	864
Town Mountain	Llano	1,285
Trap Mountain	Brewster	4,135
Travis Peak	Travis	1,250
Tres Cuevas Mountain	Brewster	3,635
Trigger Mountain	Mills	1,650
Triple Hill	El Paso	5,400
Tule Mountain	Brewster	3,833
Turkey Mountain	Kinney	1,805
Twin Buttes	Tom Green	2,200
Twin Mountains	Coryell	1,000
Twin Mountains (southern part)	Coryell	1,250
Twin Mountains (north of Stephenville)	Erath	1,250
Twin Mountains (N. E. of Stephenville)	Erath	1,500
Twin Mountains	Hamilton	1,250
Twin Mountains	Presidio	6,650
Twin Sister Peaks	Lampasas	1,650
Tyler Bluff	Cooke	1,000
Upper Juniper Spring (Chisos Mountains)	Brewster	5,000
Valley Spring	Llano	1,335
Van Horn Mountains	Culberson	5,786
Victoria Peak	Culberson	6,432
Wagon Wheel Hill	Uvalde	976
Walker Peak	Llano	1,551
Washout Mountain	Erath	1,250
Watch Mountain	Llano	1,620
Weymiller Butte	Uvalde	1,000
Wilbern's Glen	Llano	1,200
Wildhorse Mountain	Brewster	3,505
Wylie Mountain	Culberson	5,031
Willow Mountain	Brewster	3,830
Wolf Mountain	Palo Pinto	1,300
Wolf Ridge	Cooke	1,000
Yearling Head Mountain	Llano	1,669
Yegua Knobs	Lee	800

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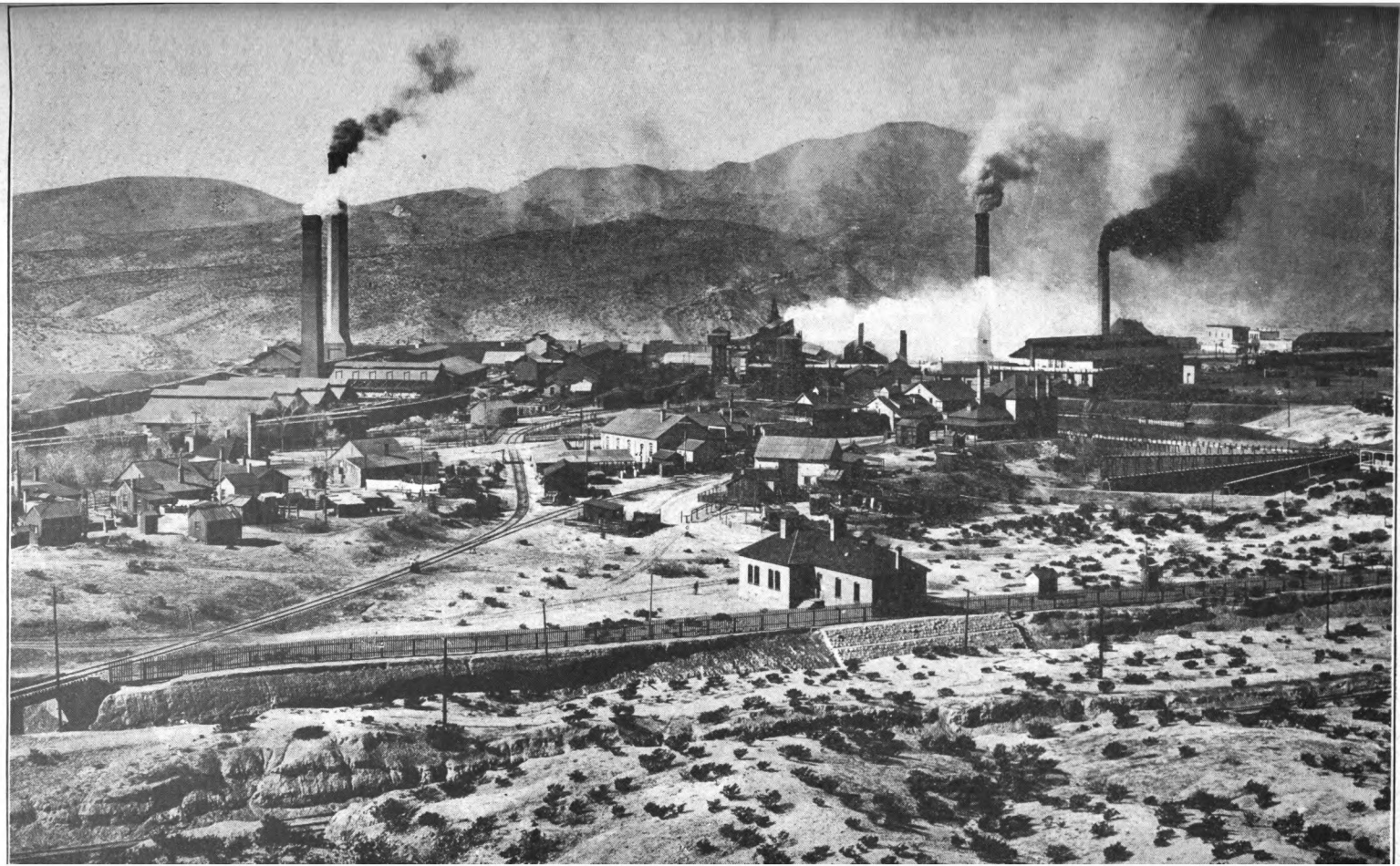

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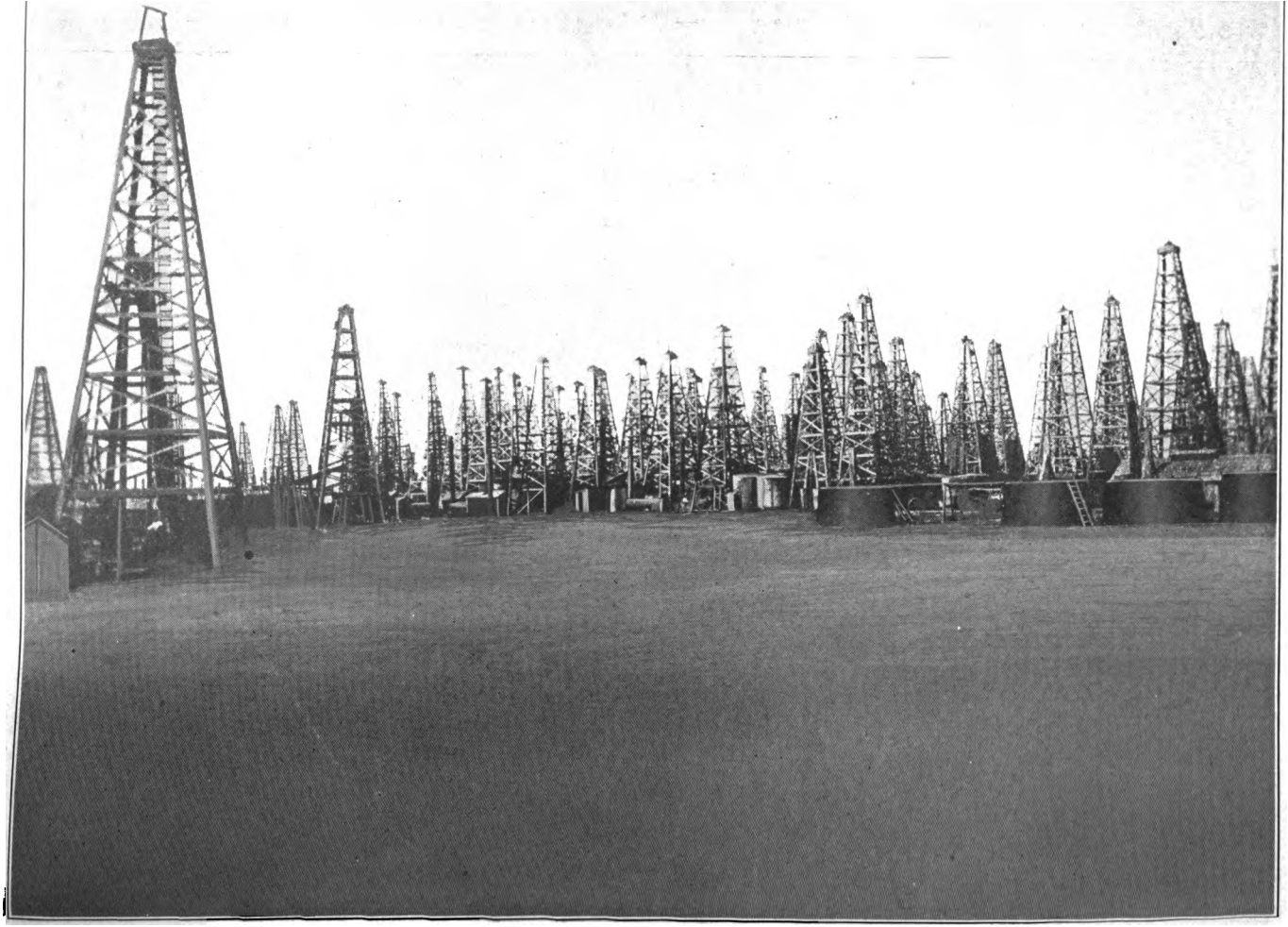

Oil Derricks—Spindle Top, near Beaumont, Jefferson County, Texas, 1901-1902

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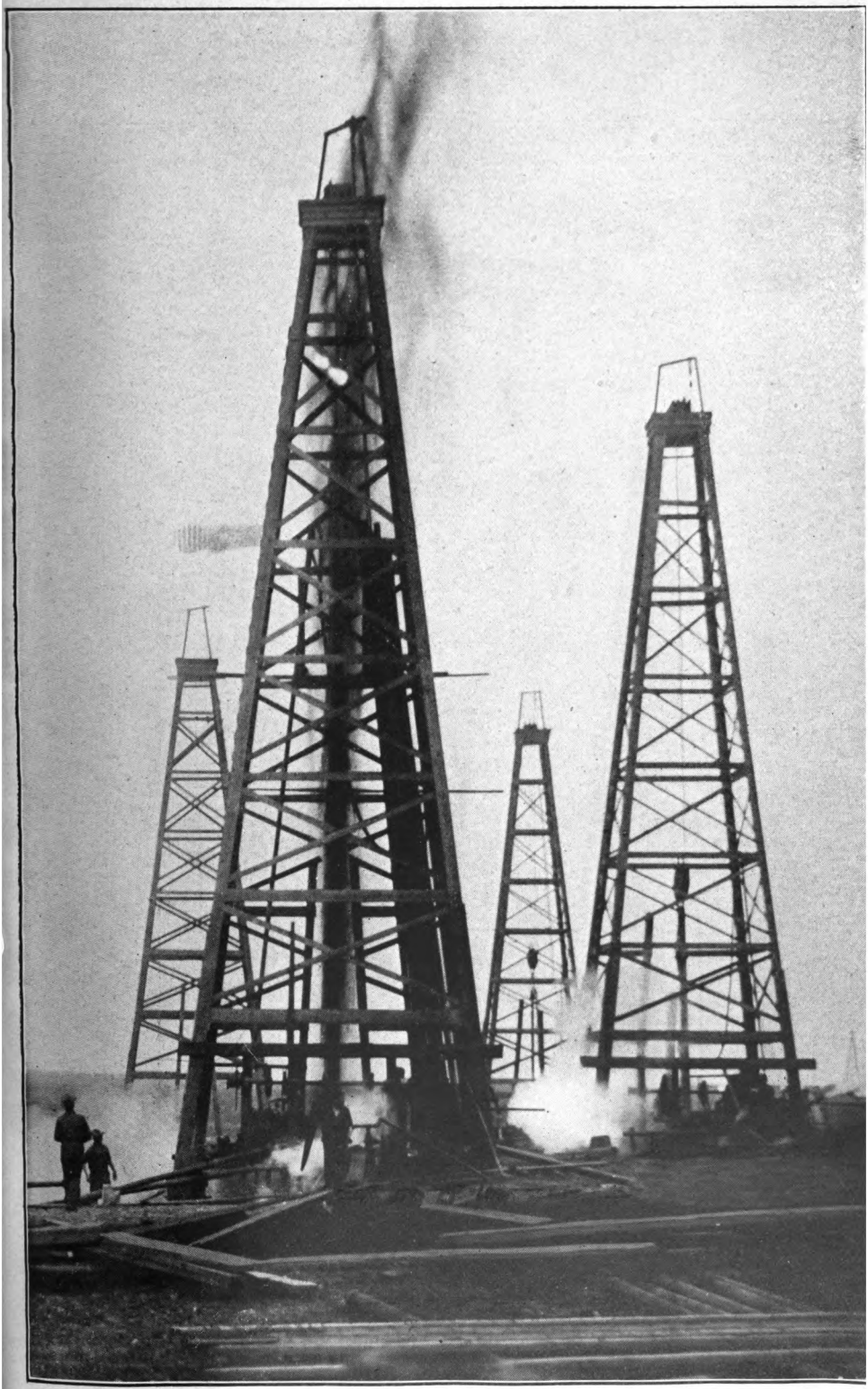

An Oil Gusher at Thrall, Williamson County, Texas

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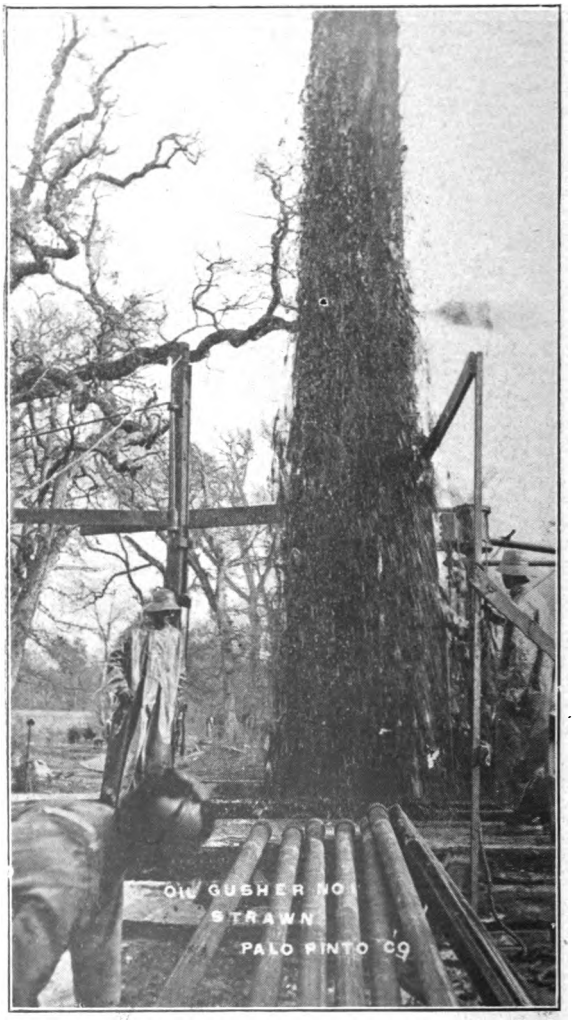

Oil Gusher near Strawn, Palo Pinto County

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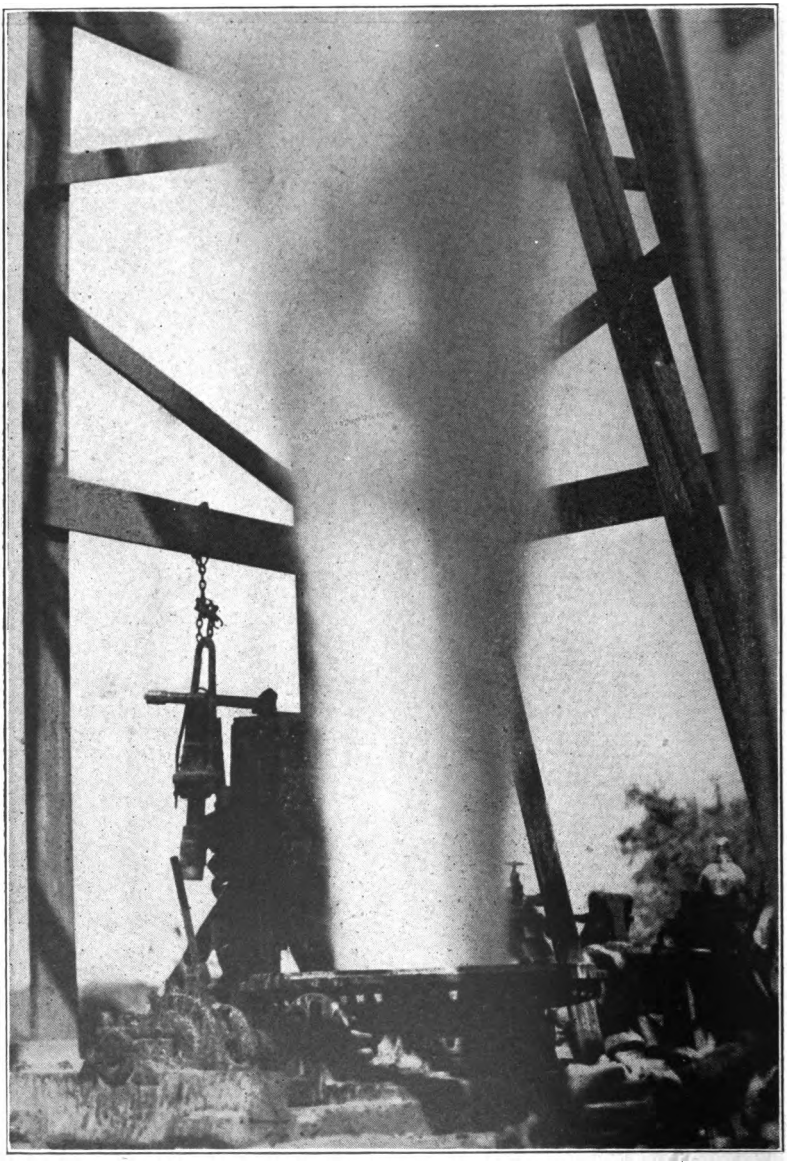

Natural Gas, White Point, San Patricio County, Opposite Corpus Christi

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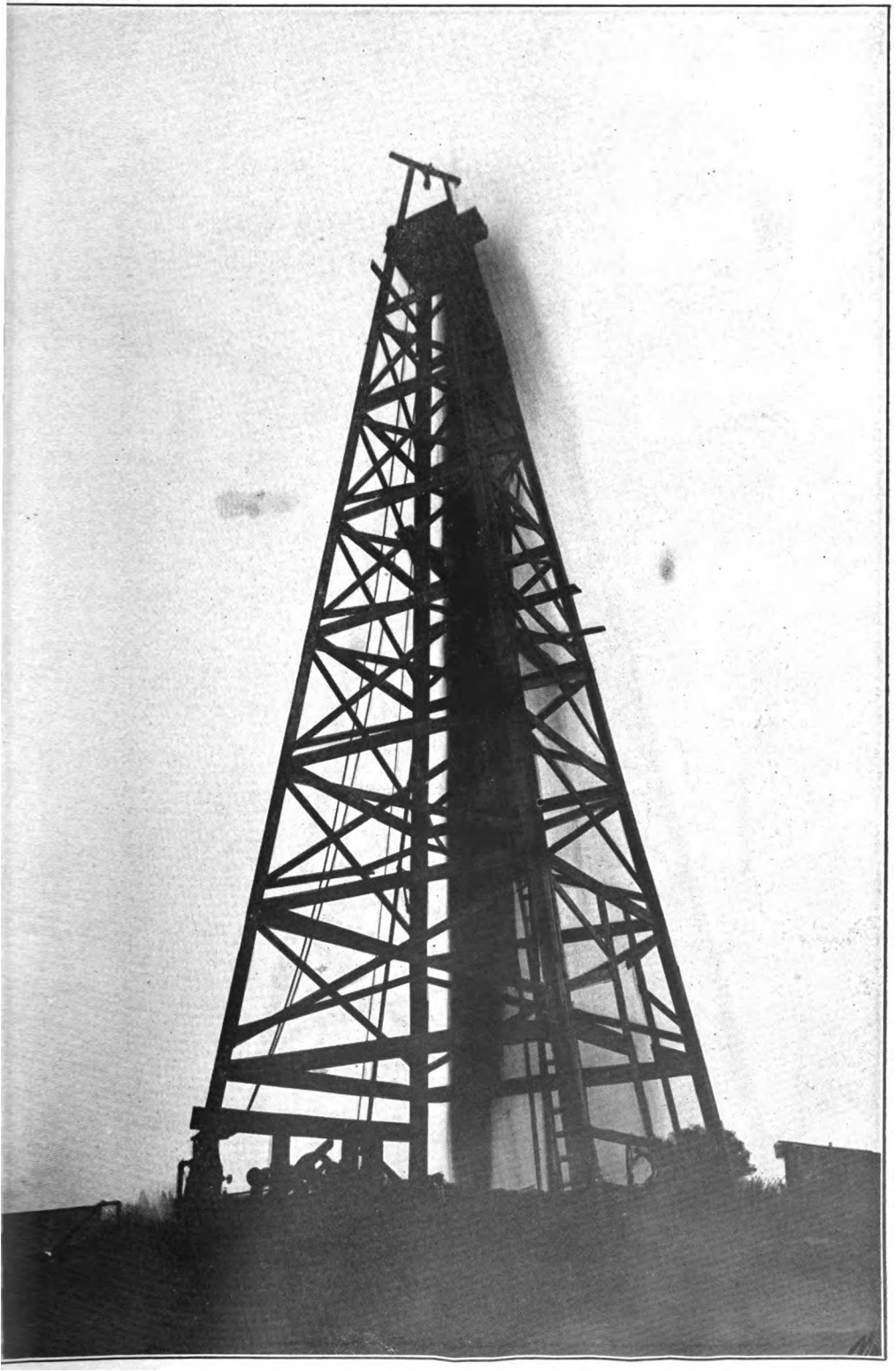

Gas Well, Little Giant Oil & Gas Co., Mexia Field, Limestone County—Oct., 19[illegible]

The Miller Gas Well, Petrolia, Clay County—Lone Star Gas Co.

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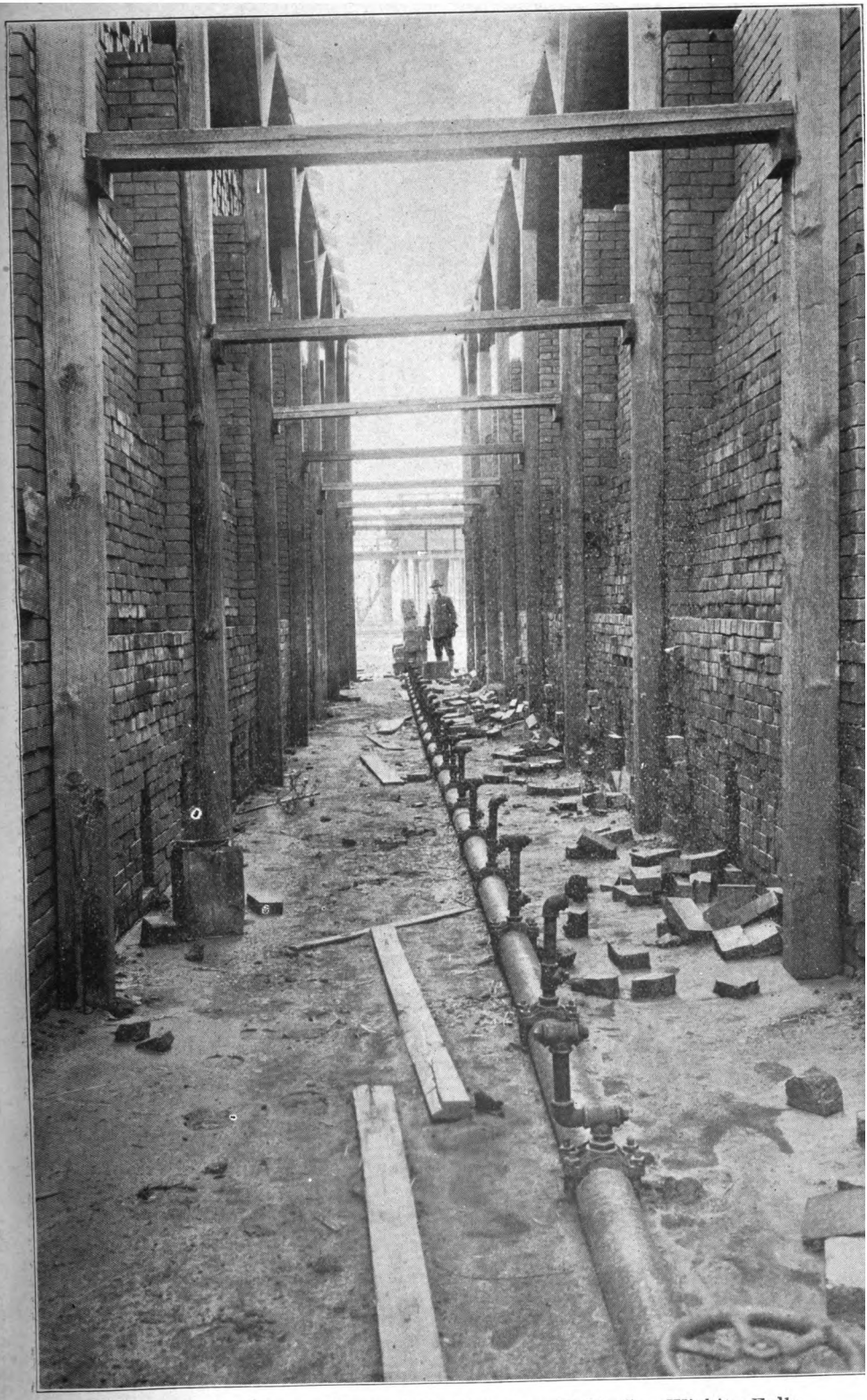

Natural Gas Line at Plant of Northwestern Brick Co., Wichita Falls, Wichita County.

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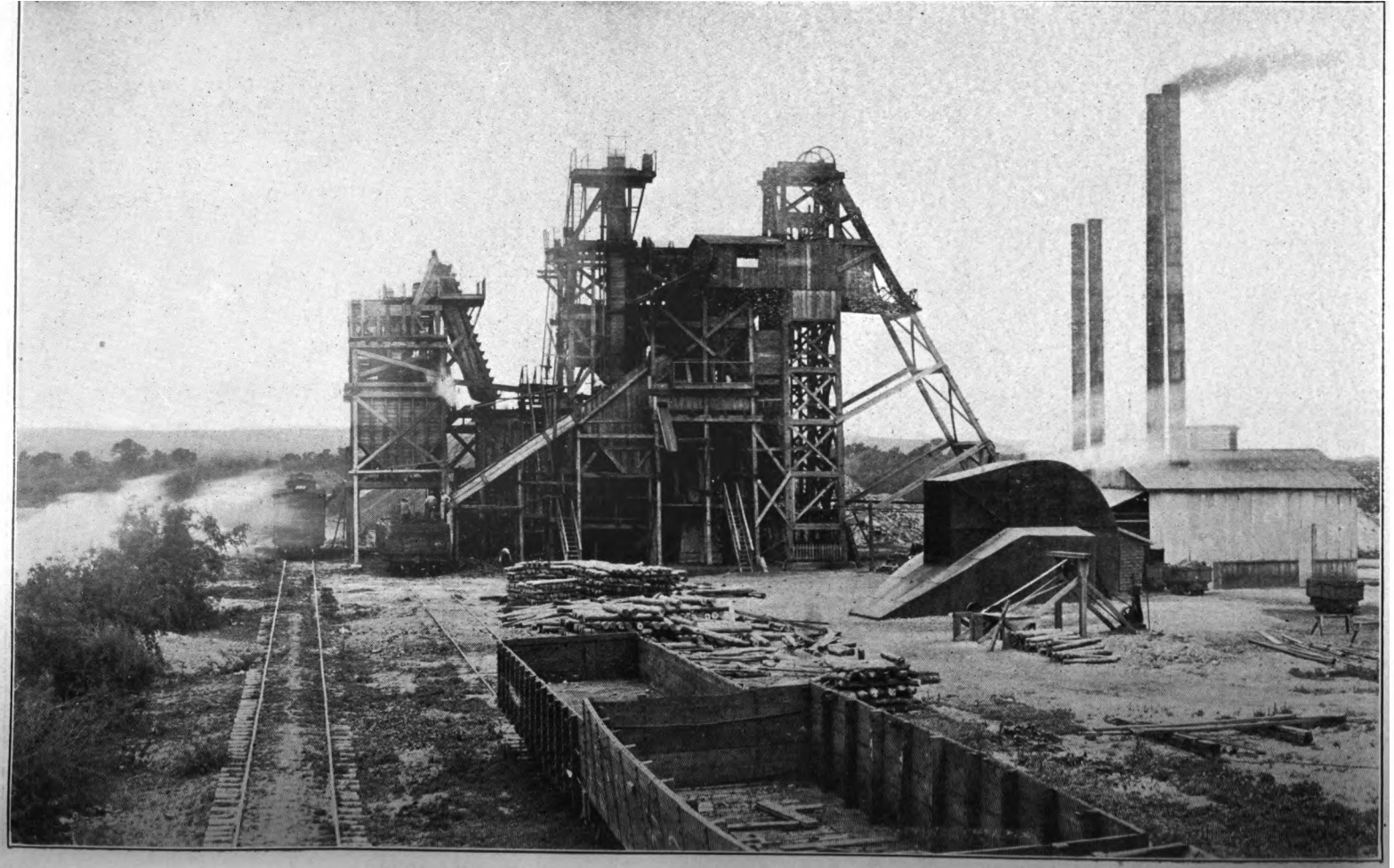

Olmos Coal Co., Eagle Pass, Maverick County.—Washer Plant.

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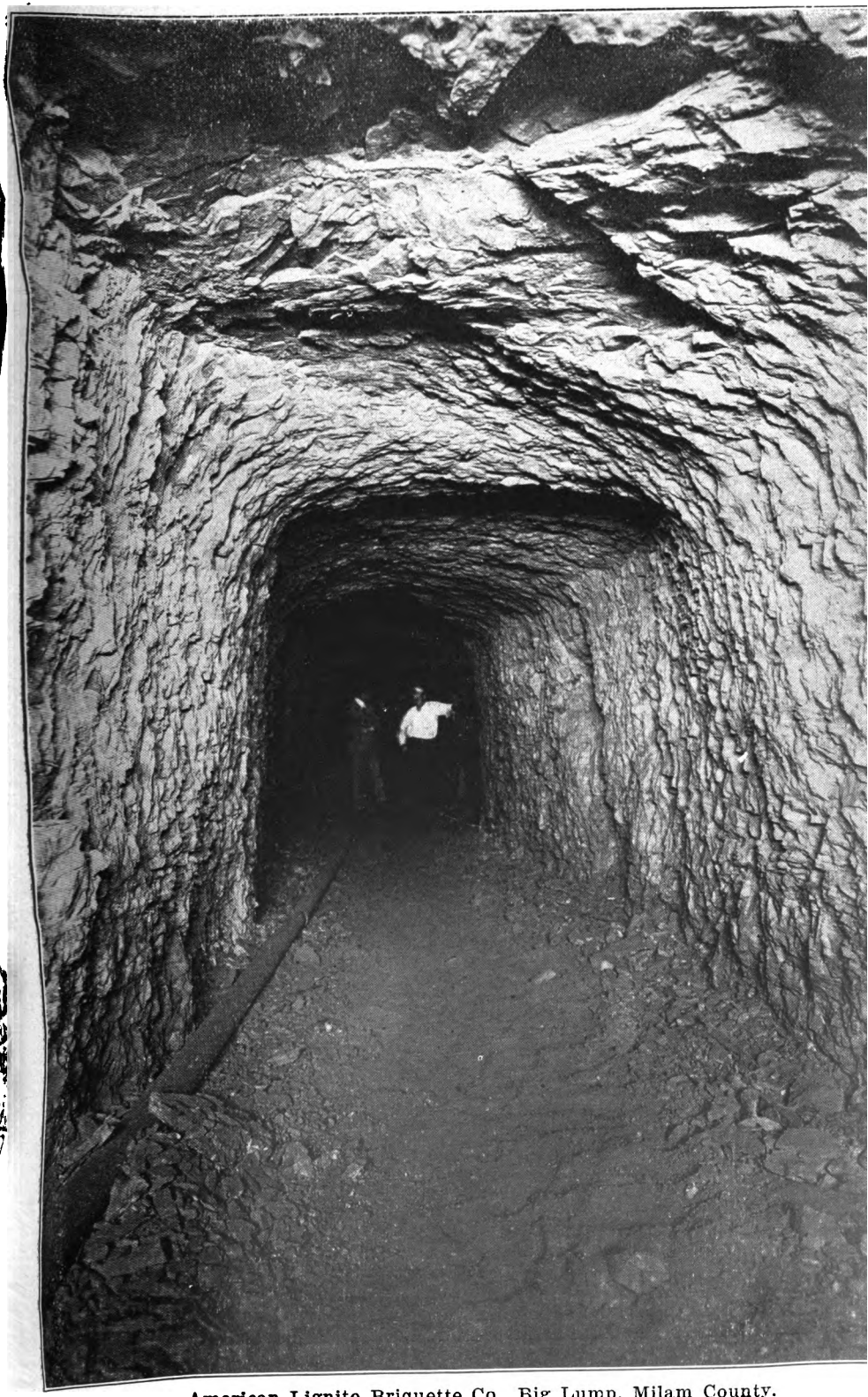

American Lignite Briquette Co., Big Lump, Milam County.
Tunnel in 10 ft. of Lignite—2,000 ft.

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Underground Electric Haulage, American Briquette Co., Big Lump, Milam County.

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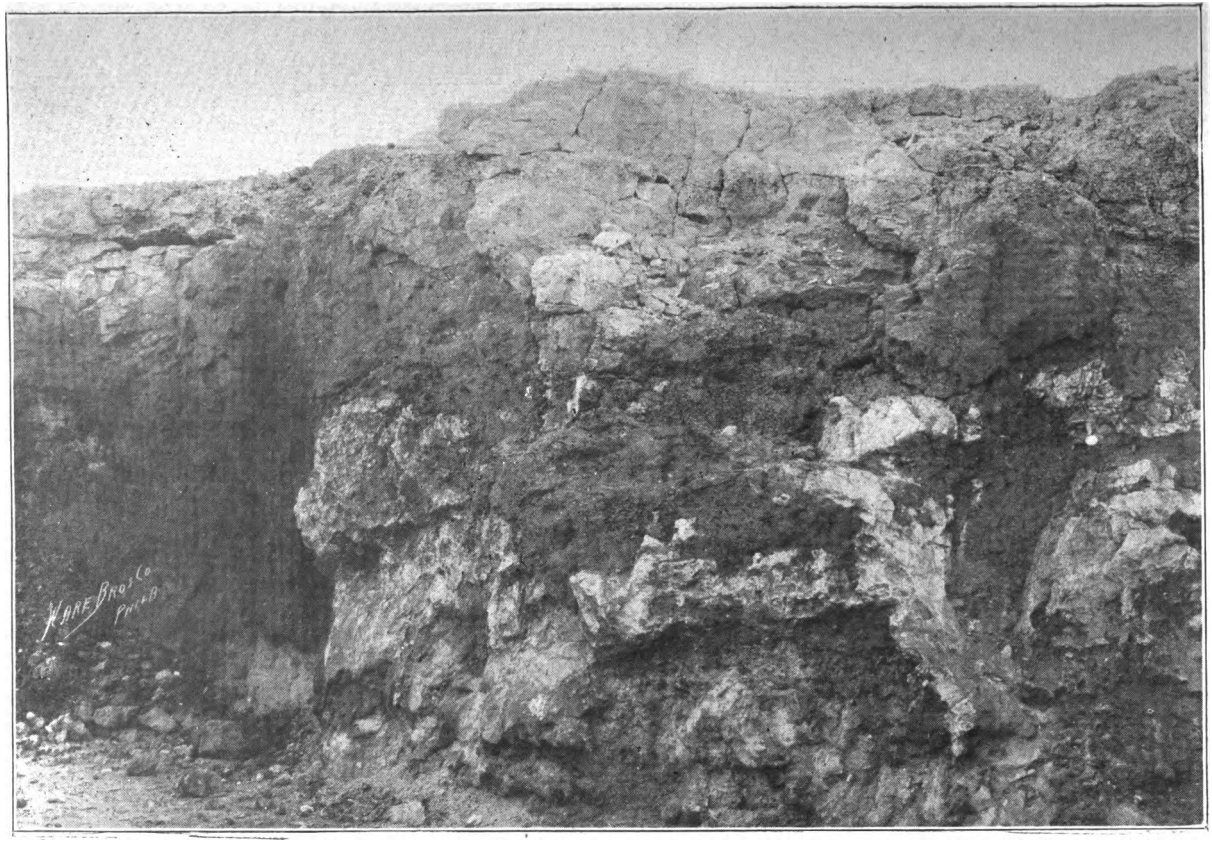

Exposure of Native Sulphur, Culberson County

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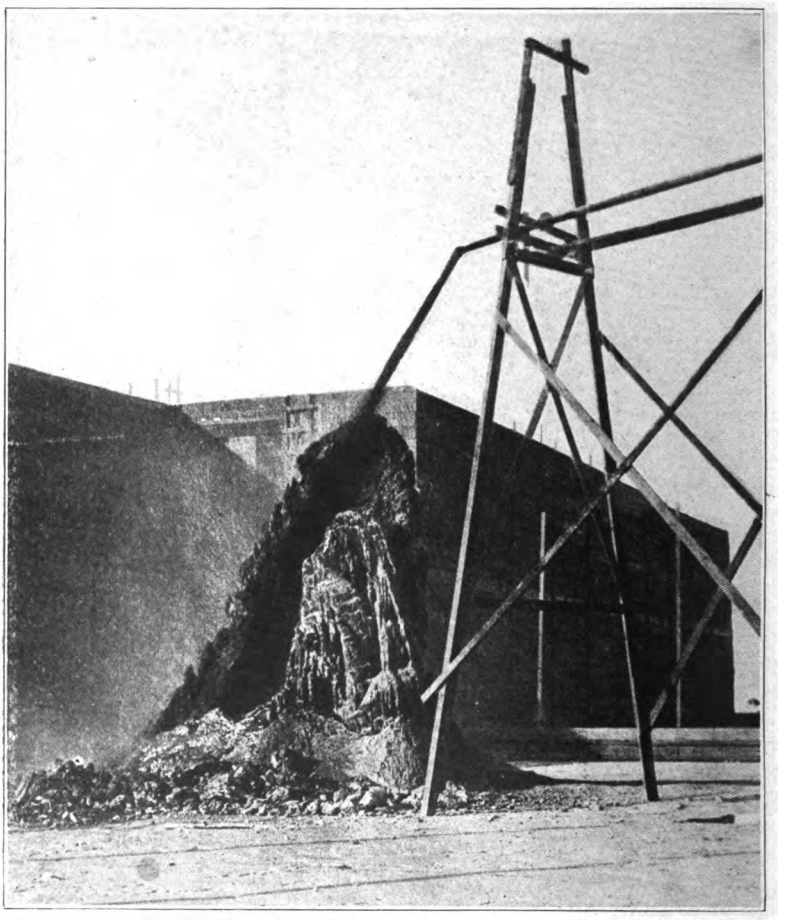
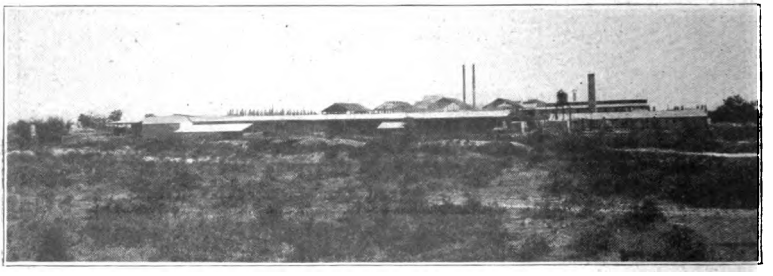


Sulphur Forced Out of Ground, Freeport Sulphur Co.,
Mouth of Brazos River



Plant of Elgin-Butler Brick & Tile Co., Butler, Bastrop County

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Red Granite Quarry, Granite Mountain, Burnet County

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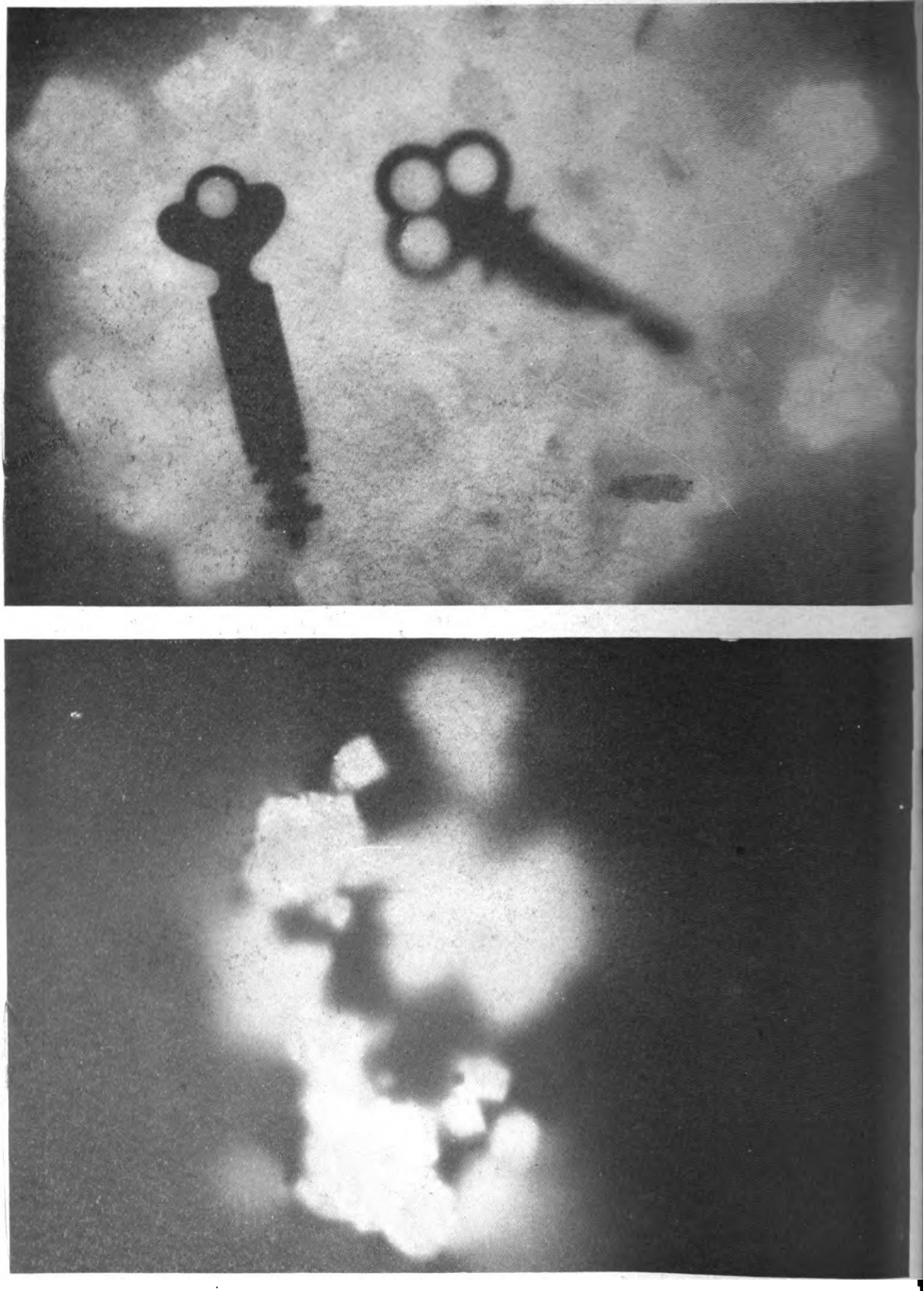

Radiographs made with Fergusonite from Barringer Hill, Llano County, Texas
Wm. B. Phillips, June, 1914

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Exposure of Silver Ore, Mina Grande Cut, Shafter, Presidio County

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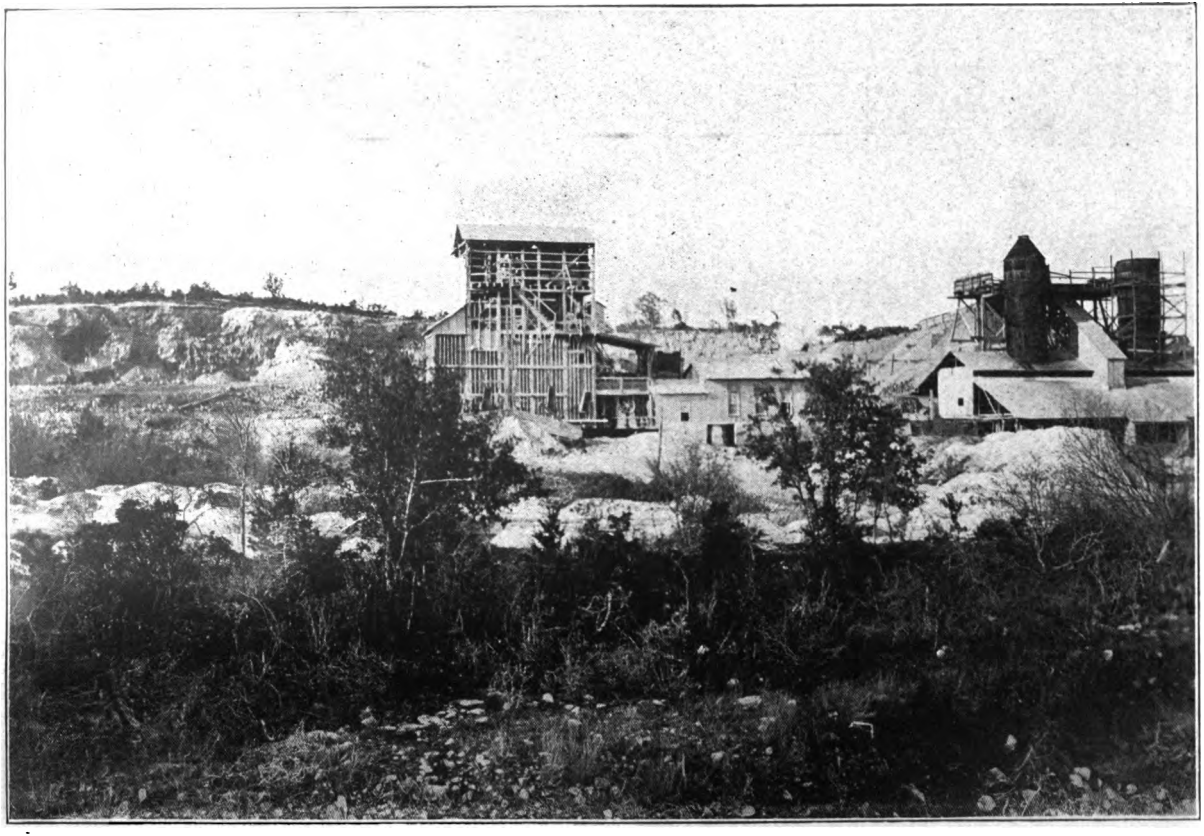

Limestone Quarry and Plant of Dittlinger Lime Co., near New Braunfels, Comal County

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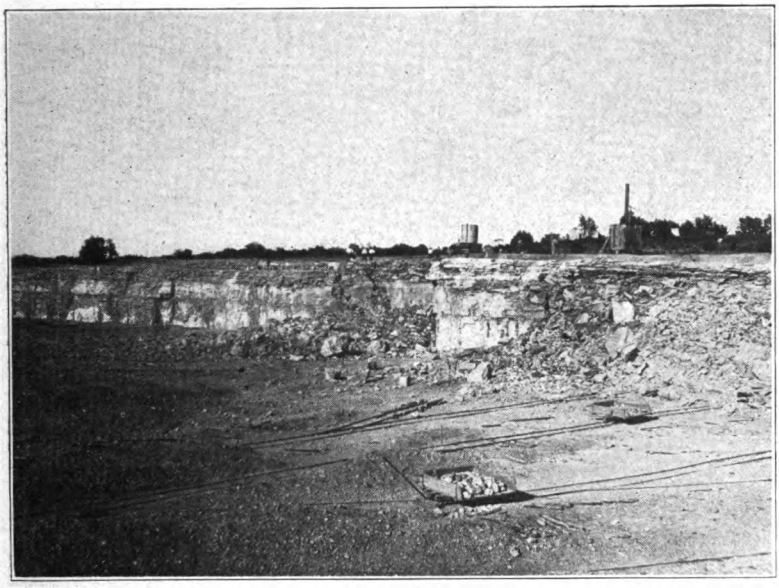
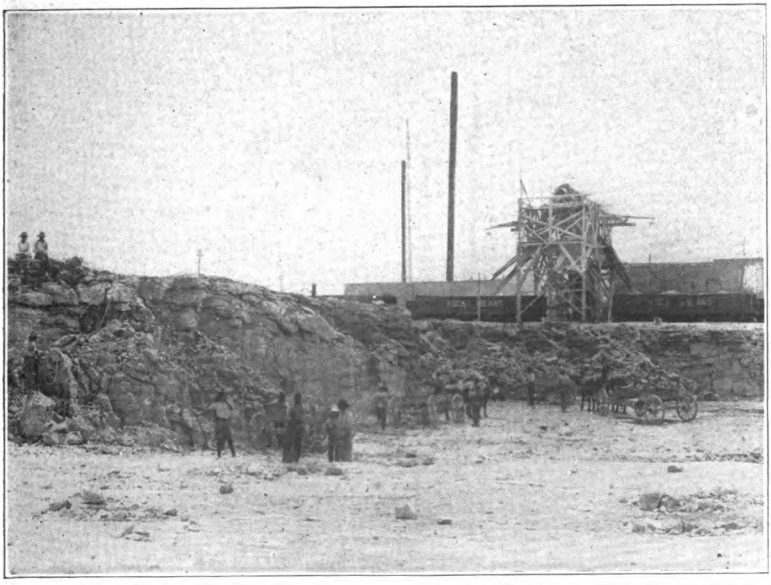


Limestone Quarry, Tiffin, Eastland County



Limestone Quarry, Risley Bros., Jacksboro, Jacks County

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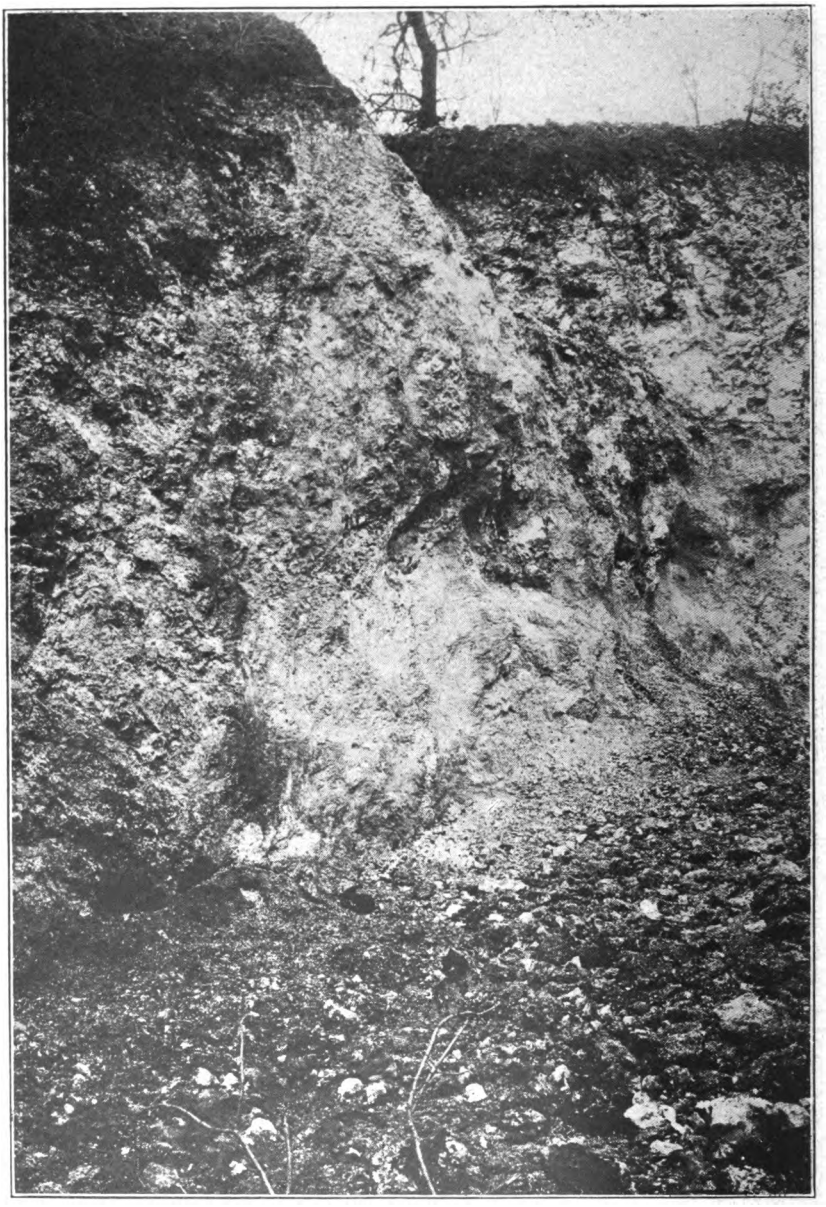

Twenty-five feet of Kaolin, near Leakey, Real County

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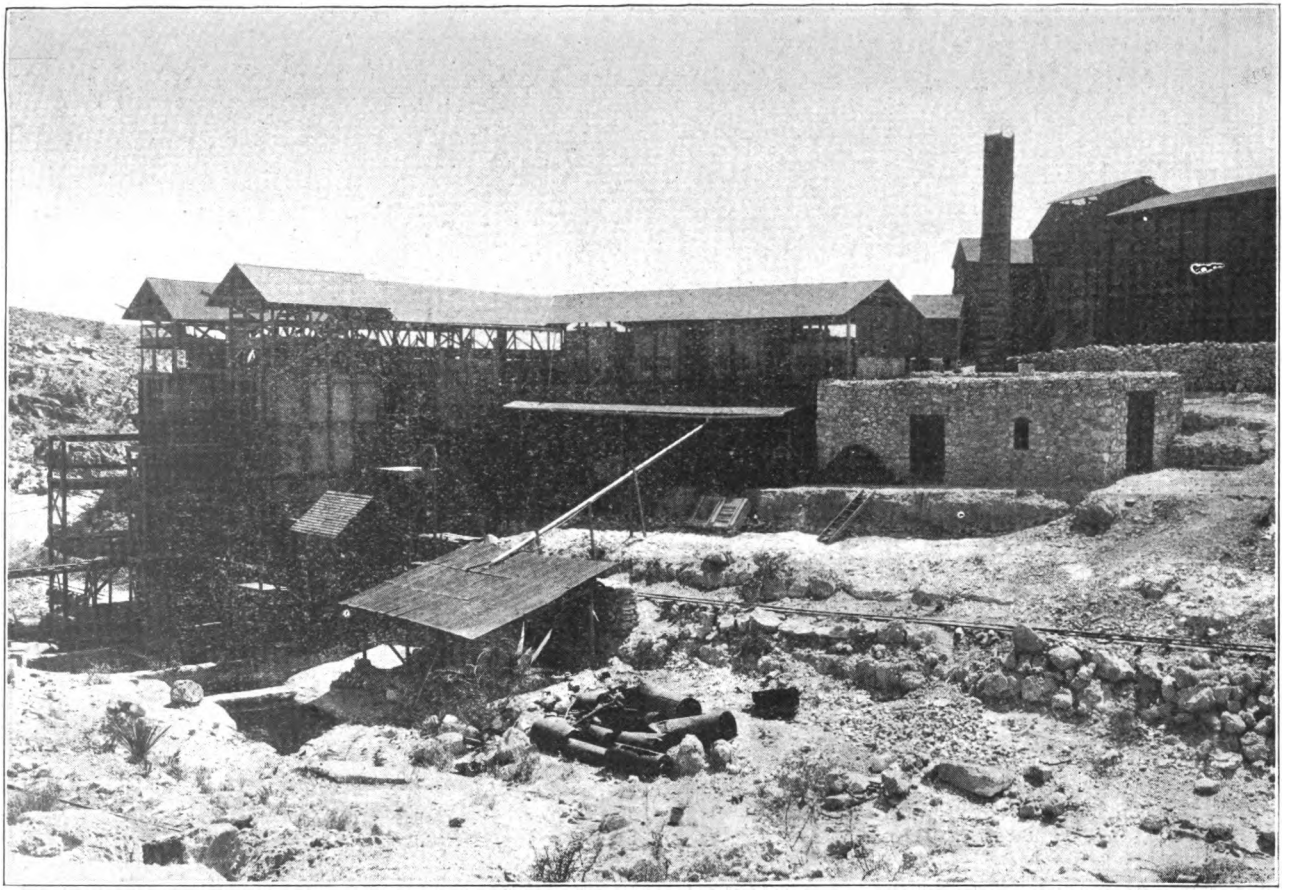

Quicksilver Furnaces—Marfa & Mariposa Mining Co., Terlingua, Brewster County

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Red Sandstone Quarry near Barstow, Ward County

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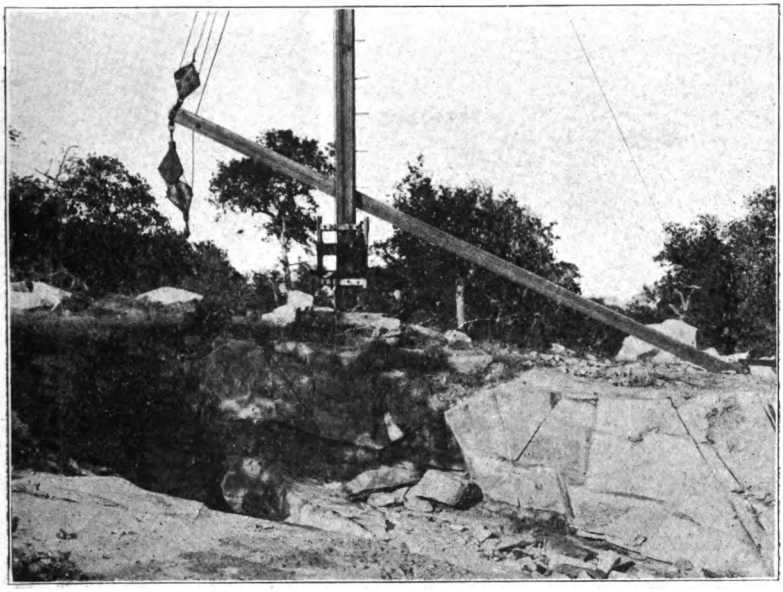
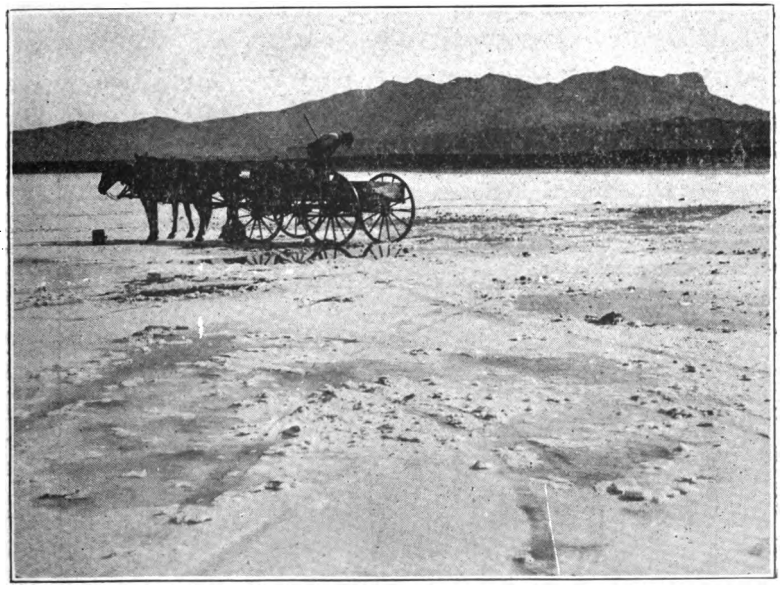


A Gray Granite Quarry, Llano County



Loading Salt, Salt Basin, El Paso County

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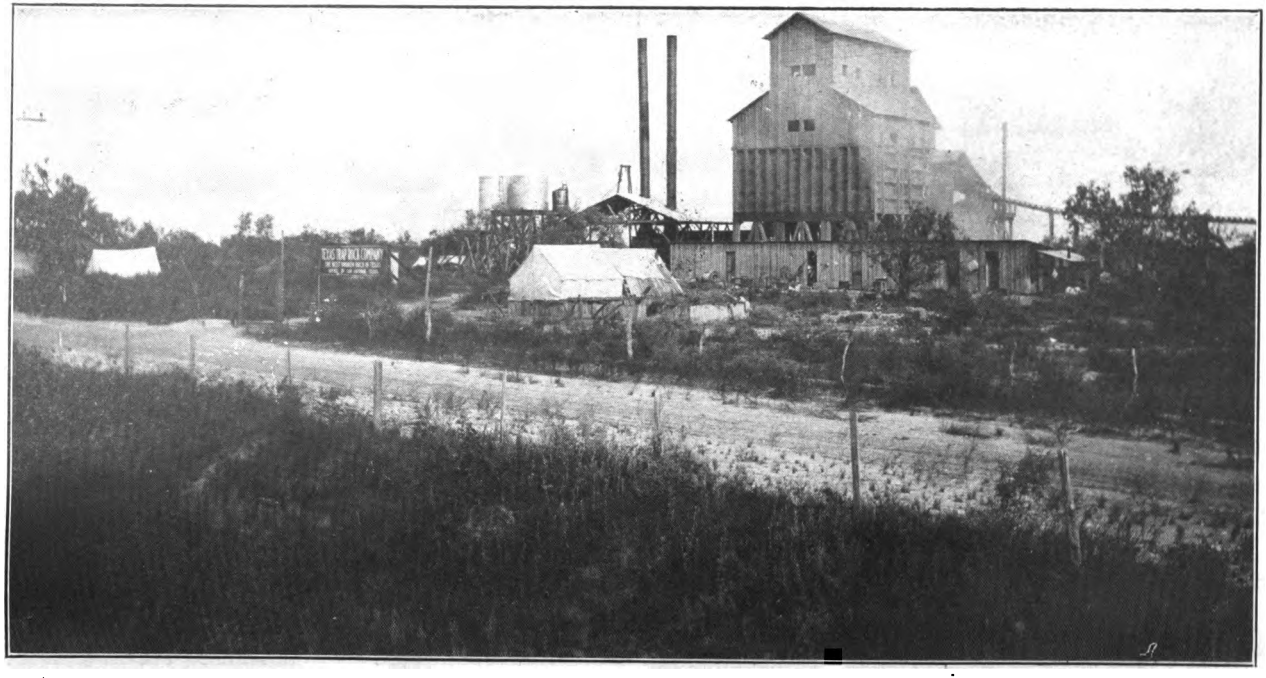

Works of Texas Trap Rock Co., Knippa, Uvalde County

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Interior View of Salt Works, B. W. Carrington & Co., Grand Saline, Van Zandt County

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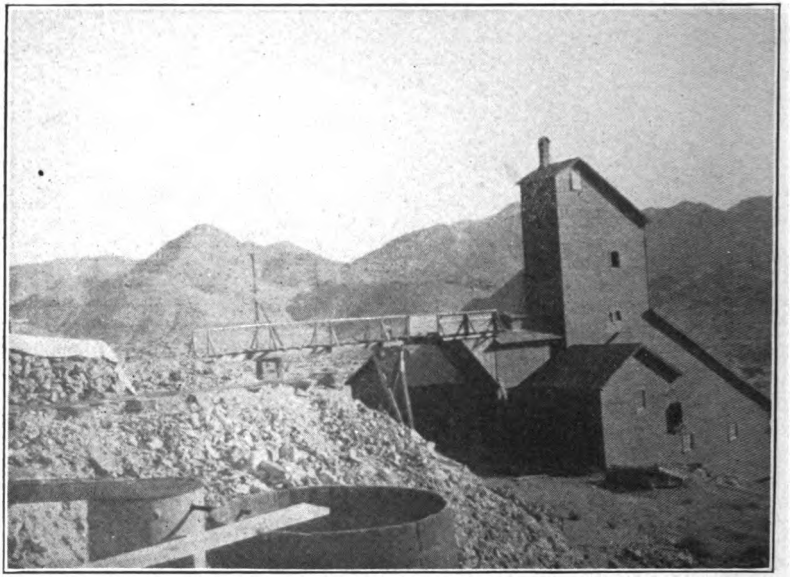
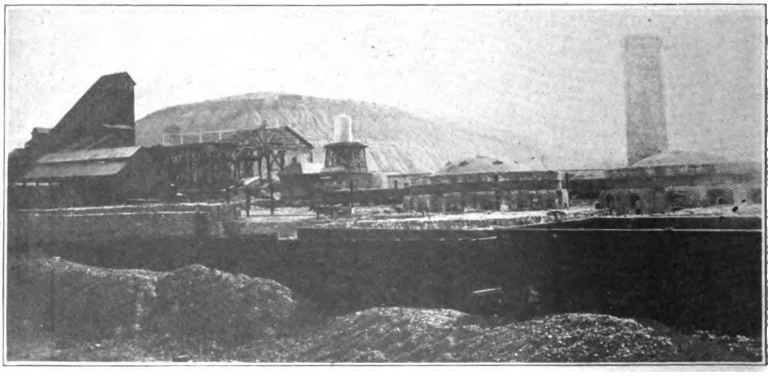


Mill for Concentrating Lead Ore, Quitman Mts., El Paso County



Plant of Thurber Brick Co., Thurber, Erath County

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Outcrop of Magnetic Iron Ore, Iron Mountain, Llano County

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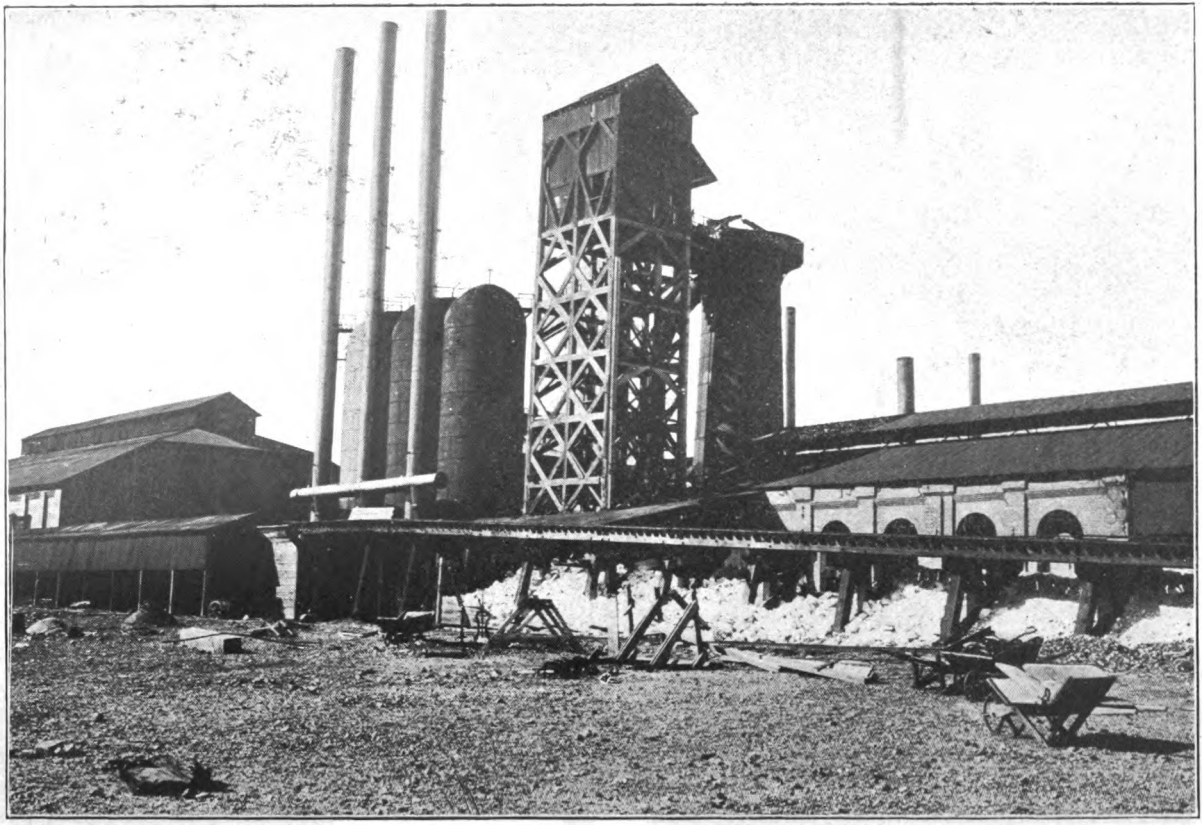

State Iron Furnace, Rusk, Cherokee County

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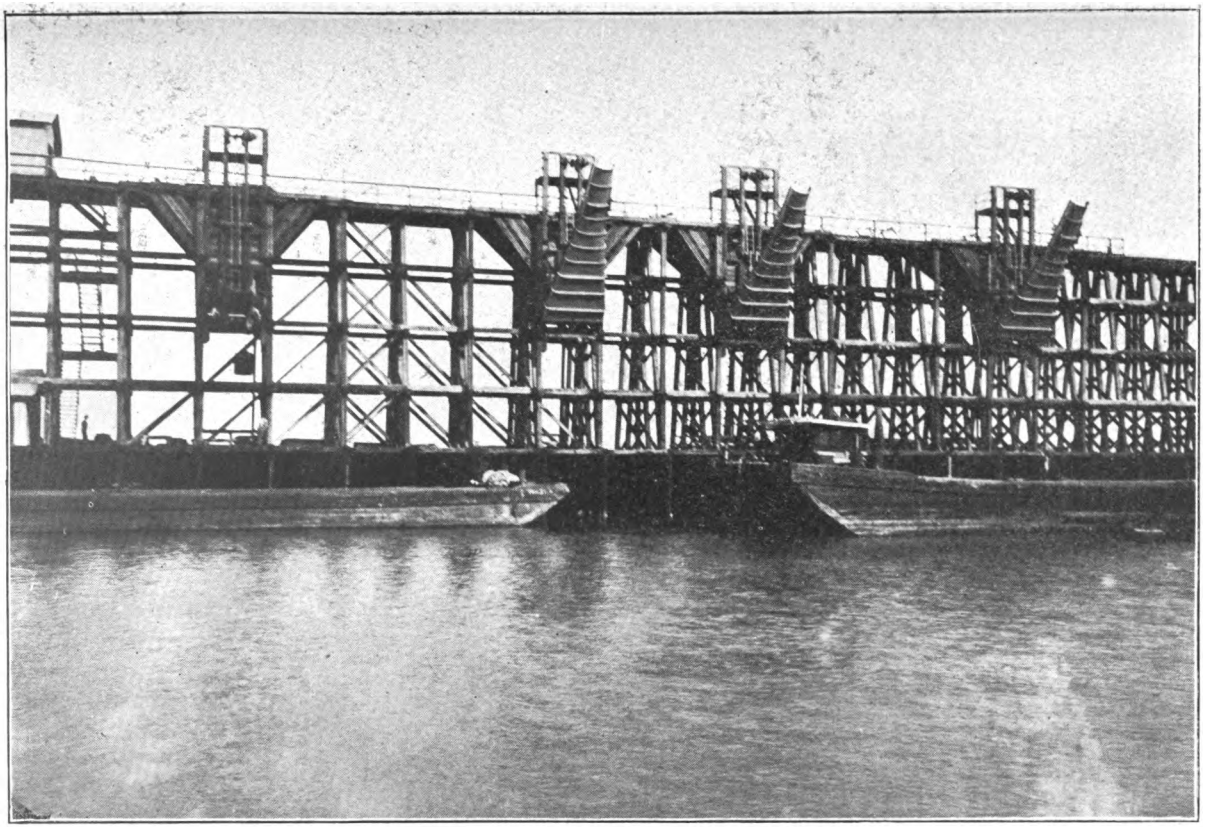

Iron Ore Dock, Port Bolivar, Galveston Bay

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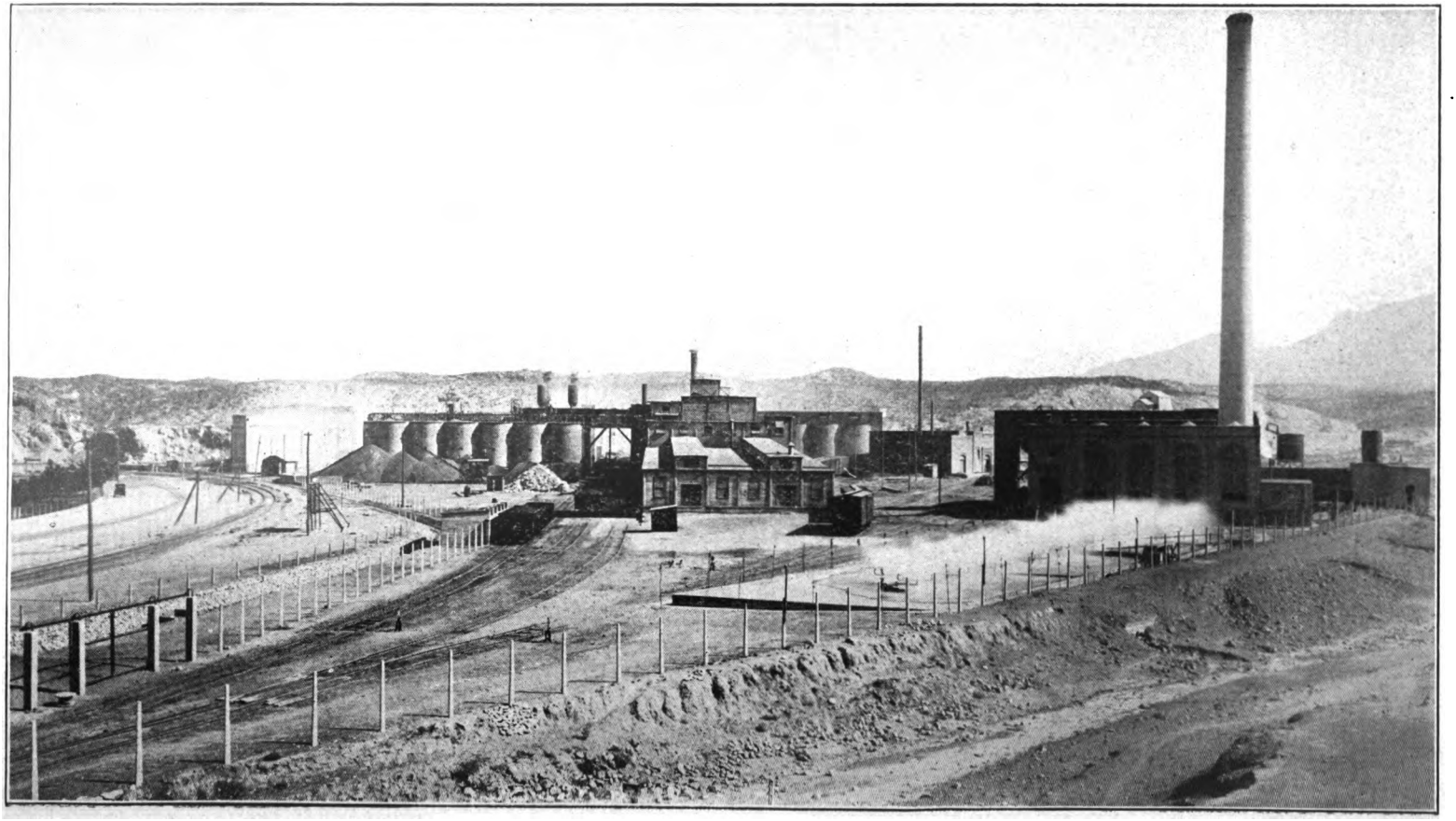

Plant of S. W. Portland Cement Co., El Paso, Texas

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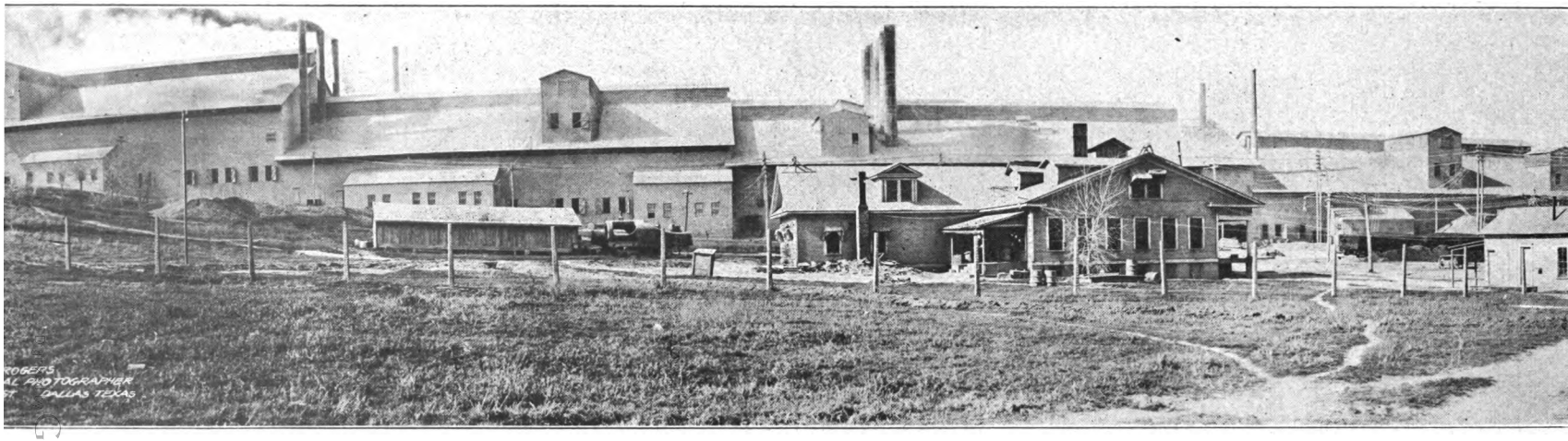
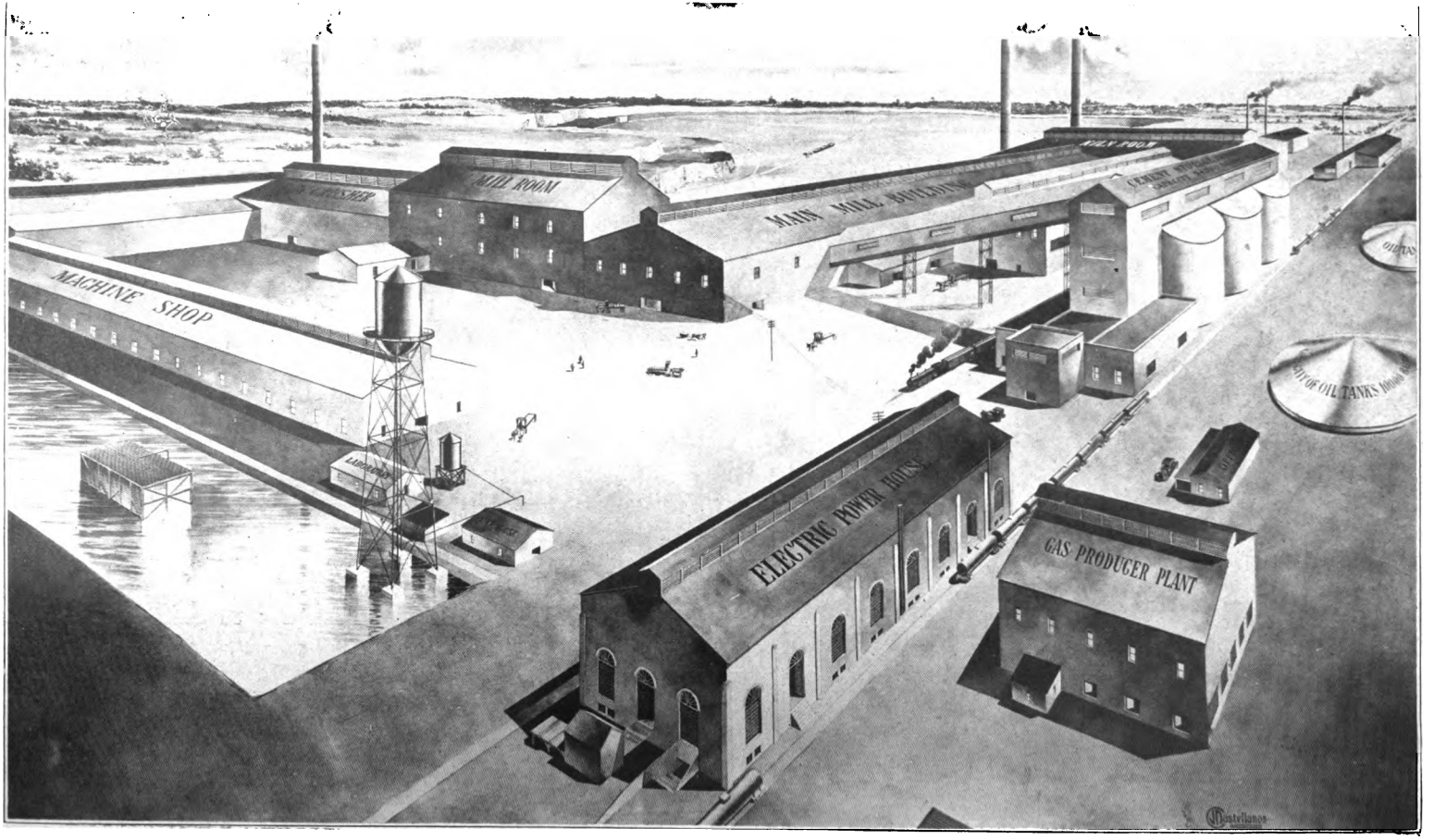


Plant of Texas Portland Cement Co., near Dallas

Google



Plant of San Antonio Portland Cement Co., near San Antonio

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